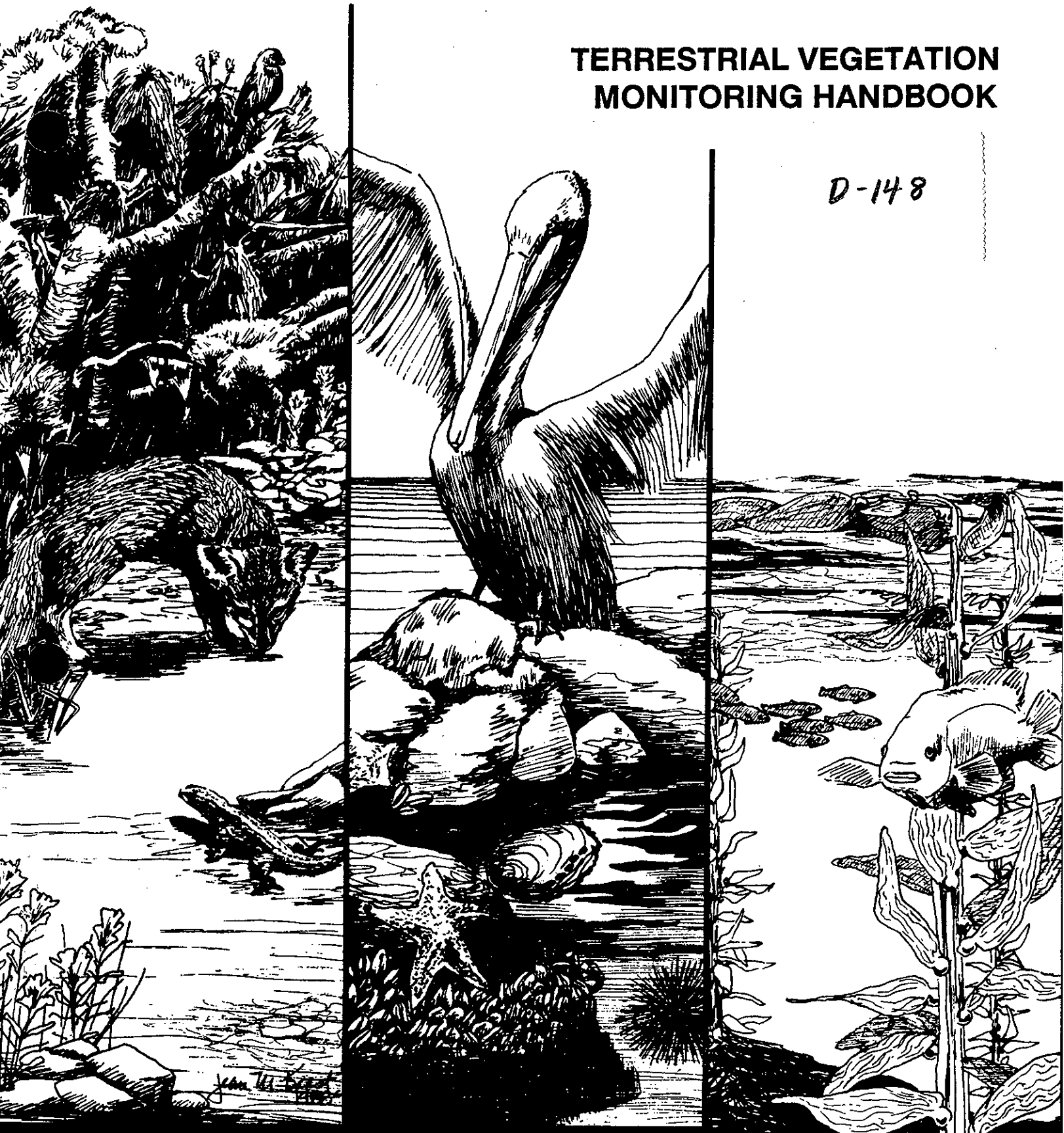
TERRESTRIAL VEGETATION MONITORING HANDBOOK



Channel Islands National Park

National Park Service
U.S. Department of the Interior

TERRESTRIAL VEGETATION MONITORING HANDBOOK

CHANNEL ISLANDS NATIONAL PARK
CALIFORNIA

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INTRODUCTION

The terrestrial vegetation of the Channel Islands is adapted to a Mediterranean climatic regime. This climate has a strong maritime influence with moderate year-round temperatures, coastal fog, precipitation during winter months, and virtually no rain from May to October. Island vegetation consists of grassland, low shrubs, and chaparral mixed with small pockets of woodland. Sea cliff, island grassland, and grassland-scrub communities cover the largest areas of the islands, with iceplant, coastal sage scrub, *Coreopsis* scrub, and woodlands occurring in scattered patches of various sizes. Alien species dominate much of the area on all islands.

Vegetation is monitored on the islands to assure preservation of distinct assemblages of species and subspecies that have evolved as a result of isolation from the mainland and other islands. In addition, all of the islands have been altered by past land use. The vegetation is in various stages of recovery from grazing, farming, military use, and introduction of exotic species. Monitoring offers an opportunity to measure natural recovery and the effectiveness of management actions to restore island vegetation.

MONITORING DESIGN CONSIDERATIONS

ISLANDS MONITORED

Vegetation monitoring has been initiated on San Miguel, Anacapa, and Santa Barbara islands, the three smallest islands in the park. These islands have low plant community diversity when compared to the larger Channel Islands that have more varied topography. Monitoring will be expanded to include other islands at a later date.

REPRESENTATIVE PLANT COMMUNITIES

While a number of options for vegetation monitoring would yield important information, this monitoring program was specifically designed to monitor the changes which are taking place in the usual vegetation units or representative plant communities. It is designed neither to monitor those communities or species that are unusual because of rarity or location nor to monitor individual plant species.

Eight hundred (800) plant taxa (species nomenclature follows Munz) are found on the five park islands; of these, 392 are found on Anacapa, Santa Barbara, and San Miguel islands. Of the 392, 27% are considered alien and were, for the most part, introduced through activities of man. A relatively large number of native plants (when compared with the known flora of the islands) that are restricted in numbers and/or geographic distribution are found on the Channel Islands. These plants include island endemics (plants that are found on one or more of the Channel Islands but nowhere else), taxa that have very limited distributions outside of the Channel Islands, taxa that are on the edge of their range, taxa identified by the California Native Plant Society as rare and endangered, and taxa designated or proposed as threatened or endangered by the U.S. Fish and Wildlife Service for protection under the Endangered Species Act. No attempt has been made to monitor any of these species individually. Instead plant communities have been adopted as the basic unit for monitoring.

The following representative vegetation communities provide the basis for the monitoring program on the three islands (also see Hochberg et al. 1979).

Grassland/Herblands

Wild Oats

The most abundant vegetation type on most of the Channel Islands is a grassland dominated by the alien *Avena fatua* or wild oats. *Avena* forms an overstory (about 1 m high) for a diverse understory consisting of a number of alien brome grasses (*Bromus*), other native grass species, and a number of forbs such as *Erodium*, *Amsinckia*, and *Dichelostemma*. In response to protection from fire and grazing, native shrubs including *Coreopsis gigantea, Lycium californicum, Artemisia californica*, and *Baccharis pilularis* are invading this community at a rapid rate. Interspersed with wild oats are occasional patches dominated by the native bunchgrass *Stipa pulchra,* and in depressions or wetter areas, patches dominated by saltgrass *(Distichlis spicata)* or by *Juncus*. On Santa Barbara Island, the alien shrub *Atriplex semibaccata* is an important associate in the grassland, covering as much as 50% of some areas.

While wild oats are a component of grasslands on Anacapa Island, these grasslands are richer in native perennial grasses and forbs than those found on Santa Barbara or San Miguel islands. Native perennials are also present on Anacapa Island, in particular *Dudleya caespitosa* and *Grindelia latifolia* indicating that there has been less disturbance there. Common native associates in this community are *Achillea millefolium, Calystegia macrostegia* ssp. *macrostegia, Castilleja affinis, Dichelostemma pulchellum, Lasthenia californica*, and *Marah macrocarpus*. Common alien species include *Erodium cicutarium, Sonchus oleraceus, Medicago polymorpa*, and *Atriplex semibaccata*.

Barley

A second type of alien grassland is dominated by barley (*Hordeum murinum* spp. *glaucum*). This grass has a canopy at about 30 cm and many fewer associated herbaceous species than the wild oats grassland. This community is widely scattered on the islands but the most important areas of its distribution are on the west and southeast terraces of Santa Barbara Island.

Annual Iceplant

Two species of crystalline iceplant (*Mesembryanthemum crystallinum* and *M. nodiflorum*) are present on all three islands. The control of these species has become a serious management concern, especially on Santa Barbara Island where large dense patches of *M. crystallinum* develop. The species accumulate salts which are leached into the soil when the plants die creating an environment unsuitable for most other plants. The displacement of other species along with the nature of crystalline iceplant as a summer annual leaves the soil surface unprotected by plants during the winter rainy season resulting in extensive erosion. Occasionally the salt tolerant shrub *Suaeda californica* (a native species) becomes established in the crystalline iceplant patches and acts as the only stabilizing mechanism in these areas. On Anacapa and San Miguel islands, annual iceplant forms only a few large patches associated with erosion surfaces. Otherwise the species are restricted to narrow bands around small eroded areas and along the top of sea cliffs.

Shrubland

Native shrublands are varied on the three islands that are monitored. Shrubs are more widespread in areas that have experienced little disturbance or had time to recover from the disturbance. Shrub communities include:

Sand Dunes

Of the three islands monitored, only on San Miguel Island are beach dunes large enough to provide habitat for a dune plant community. The dunes that are nearest the water support a community dominated by *Abronia maritima* and *Cakile edentula*. Further inland, away from the heavy impact of surf and wind, the community becomes more diverse with *Ambrosia chamissonis, Astragalus miguelensis, Camissonia cheiranthifolia, Carpobrotus aequilaterus*, and *Malacothrix incana*. As the sands of San Miguel Island become more stabilized, the sand dune community grades into *Haplopappus* scrub.

Sea Cliff Scrub

Rugged sea cliffs rise steeply from the sea to 700 m to surround Santa Barbara Island and much of Anacapa Island. Exposed rocky cliffs and shallow soils which support the sea cliff scrub community create harsh growing conditions. Because they are inaccessible, cliff communities are undisturbed by past land uses and act as refuges for island vegetation that have been modified by farming and grazing by feral and domestic herbivores in more accessible areas. The widely scattered shrubs and succulents of the sea cliff scrub are low growing (less than 60 cm), with the notable exception of *Coreopsis*.

The sea cliff scrub community supports many species that are also found in other island communities. However, a number of rare species and island endemics with limited distribution are found in this community. *Eriogonum giganteum* var. *compactum, Eriophyllum nevinii*, and *Dudleya traskiae* are largely restricted to the inaccessible cliffs of Santa Barbara Island. All three of these species are island endemics. *Dudleya traskiae* is restricted to Santa Barbara Island and is on the federal list of endangered species. The other two are under consideration for listing by the federal government.

The sea cliff scrub community on Anacapa Island is almost entirely restricted to the north-facing slopes that intercept prevailing onshore winds. Dominated by bare rock, the community is composed of a large number of species, none of which are widespread. Representative species include *Dudleya caespitosa, Eriogonum grande* var. *grande, Coreopsis gigantea, Malacothrix implicata, Eriophyllum, Haplopappus,* and various annual grasses.

Rocky sea cliffs are widely scattered on San Miguel Island because much of the shoreline is composed of sandy beaches. Important species are *Achillea millefolium, Artemisia californica, Coreopsis gigantea, Erigeron glaucus, Eriogonum grande* ssp. *rubescens, Lotus dendroideus* var. *veatchii, Malacothrix saxatilis* var. *implicata*, and *Marah macrocarpus*.

Caliche Scrub

The west end of San Miguel Island is inhabited by a curious assemblage of plants in a landscape that is dominated by a ground surface of caliche. This surface is a result of overgrazing and wind scouring of the island that has stripped away most soil. Patches of vegetation are found where there is a mound of sand or a rare pocket of soil. Important species in this community are *Carpobrotus aequilaterus, Erigeron glaucus, Astragalus miguelensis, Parapholis incana*, and *Sisyrinchium bellum*. A number of weedy species adapted to disturbance sites are associates in this pioneer community.

Coreopsis Scrub

Coreopsis gigantea is one of the most picturesque species on the islands. This semi-succulent shrub can attain heights of 2.5 m and has bright clusters of sunflower-like flowers that follow the emergence of drought-deciduous new leaves during the rainy period. *Coreopsis* once covered large portions of gentle island slopes, but was restricted by farming, grazing, and fire to steep slopes and isolated canyons. These populations are now expanding and may once again cover larger areas of each island. Newly developing stands are expanding into grassland and have a grassland understory. A typical mature stand often has a closed canopy, prohibiting, by shading and perhaps allelopathy, any understory development. However, where mature stands exist on moist north-facing canyon slopes (as in Cave Canyon on Santa Barbara Island), the understory may include dense stands of shade tolerant species. In most situations there are no shrub species which are important associates in a mature *Coreopsis* stand. Herbaceous associates are *Calystegia macrostegia* ssp. *amplissima, Marah macrocarpus, Pterostegia drymarioides*, and other shade tolerant species. *Coreopsis* also occurs in some mixed shrub communities with *Hemizonia clementina* and *Opuntia* on Santa Barbara Island.

Coastal Sage Scrub

This community is primarily found on the south and west slopes of the islands and, except for San Miguel Island, in relatively small, scattered patches. It is characterized by coastal sage, *Artemisia californica* var. *insularis* on Santa Barbara and *Artemisia californica* var. *californica* on Anacapa and San Miguel islands. Important associates are *Dudleya traskiae, Encelia californica, Eriogonum arborescens, Eriogonum giganteum* var. *compactum, Opuntia littoralis*, and *O. prolifera* on Santa Barbara Island; *Dudleya caespitosa, Opuntia littoralis, Opuntia prolifera, Haplopappus detonsus, Salvia mellifera, Bromus rubens, Calystegia macrostegia, Haplopappus venetus* and *Malacothrix saxatilis* var. *implicata* on Anacapa Island; and *Lotus dentroideus* var. *veatchii, Bromus rubens, Calystegia marcrostegia, Haplopappus venetus*, and *Malacothrix saxatilis* var. *implicata* on San Miguel Island.

Maritime Cactus Scrub

This community only occurs on one of the park islands, the south facing slopes of Santa Barbara Island. It is characterized by prickly pear (*Opuntia littoralis* and *O. oricola*) and cholla (*Opuntia prolifera*). Other important associates are *Ambylopappus pusillus, Marah macrocarpus, Perityle emoryi, Eriophyllum nevinii, Eriogonum giganteum* ssp. *compactum*, and *Dudleya traskiae*.

Sea-Blite Scrub

Also occurring only on Santa Barbara Island, this community is dominated by *Suaeda californica*. This shrub generally forms an open community with large bare areas or patches of grass or crystalline iceplant (*Mesembryanthemum crystallinum*) scattered among the shrubs. The alien grass *Hordeum murinum* ssp. *glaucum* is the most common herbaceous species in the community. Other associated species are *Frankenia salina, Spergularia macrotheca*, and *Mesembryanthemum nodiflorum*.

Boxthorn Scrub

This community is characterized by boxthorn (*Lycium californicum*) and is only found on Santa Barbara Island within the park. The community is found on warm south-facing slopes and is often associated with the maritime cactus scrub community. Where these 0.5-m tall shrubs are widely scattered, the spaces are filled with annual grasses, but most often they group together to form a dense canopy which excludes most other species. The federally listed threatened island night lizard (*Xantusia riversiana*) is frequently found inhabiting this community. Boxthorn scrub has recently become a preferred nesting site for California brown pelicans.

Haplopappus Scrub

The second most abundant plant community on San Miguel Island is a low (up to 0.5 m) shrub community dominated by *Haplopappus venetus*. This community occurs on poorly developed soils that are either thin and rocky or sandy. It is unclear whether *Happlopappus* is a climax community on these poorer soils or a long-term seral stage which will give way to either a grassland community or a chaparral community with improving microenvironmental conditions. It is believed that this community is so widespread because of past habitat disturbance. There is no comparable community on any other of the Channel Islands. Important associates are *Achillea millefolium, Astragalus miguelensis, Atriplex californica, Baccharis pilularis* ssp. *consanguinea, Carpobrotus aequilaterus, Dudleya greenei, Eriogonum grande* ssp.*rubescens, Erysimum insulare*, and *Malacothrix incana*.

Island Chaparral

A few scattered stands of what appear to be relics of a once more widely distributed chaparral community are found on West Anacapa Island in the larger canyons of the north side. The stands include toyon (*Heteromeles arbutifolia*) and/or island bigpod ceanothus (*Ceanothus megacarpus* ssp. *insularis*). The stands on Anacapa are depauperate in comparison to chaparral found on the larger islands and on the southern California mainland. One individual of *Comarostaphylos diversifolia* ssp. *planifolia* is found at the head of Oak Canyon. These woody species should be protected and monitored to assure their future expansion.

On San Miguel Island, the chaparral community was largely extirpated by grazing animals and by ranchers using the wood for fires. Today a few chaparral species are found in scattered locations as small remnants of a formerly more extensive community. The largest remaining patches are of soft chaparral species of shrub lupine (*Lupinus albifrons, L. arboreus*, and *L. chamissonis*). These patches are expanding into the grassland and therefore have a typical grassland assemblage of understory species. Other important species are lemonadeberry (*Rhus intergrifolia*) found scattered along the sea slopes on the north side of the island, in Willow Canyon, and on the eastern portion of the island near Cardwell Point; and *Lavatera assurgentiflora* ssp. *assurgentiflora* found on the far west end of the island at Point Bennett and on the east end of the island near Cardwell Point. These two restricted species also should be protected and monitored periodically to record any population expansion or community development.

Introduced Iceplant

Perennial Iceplant

A community dominated by perennial, sea-fig type iceplant of the genera *Carpobrotus* and *Malephora* covers extensive areas on the south side of East Anacapa and on the upland, unstable sand areas of San Miguel Island. On East Anacapa Island *Malephora crocea* covers a large portion of the northern half of the islet. Here the iceplant appears to effectively eliminate associated native species as it spreads into new territory.

On San Miguel Island *Carpobrotus aequilaterus* appears to be important as one of the primary stabilizers of drifting dune sands and as such plays an important role in the restoration of island vegetation. Once established, this perennial iceplant forms a low (30 cm) tangled mat of vines and provides a more protected microhabitat for other species to colonize. Associated species are *Astragalus miguelensis, Malacothrix incana, Poa douglasii*, and *Distichlis spicata*. While this iceplant does not appear to effectively eliminate native species as does *Malephora crocea*, it does not fade from the stabilized dune community, but maintains its importance.

Woodland

Island Woodland

This community type is represented by small stands of island oak (*Quercus tomentella*) and Catalina cherry (*Prunus ilicifolia* ssp. *lyonii*) in canyons on the north side of West Anacapa Island. There is a thick litter layer under these small trees, therefore the understory of the community is rather sparse and made up mostly of native perennials such as climbing penstemon (*Keckiella cordifolia*), catchfly (*Silene laciniata*), *Lilium humboltii*, and poison oak (*Toxicodendron diversilobum*). These species are also important associates with grasses and other herbs in a more dense ground cover on open slopes away from the oak canopy.

Riparian Woodland - San Miguel Island has running water in a number of the larger canyons and a recognizable riparian community at some locations. Species in these riparian areas include *Salix lasiolepis* var. *lasiolepis, Coreopsis gigantea, Baccharis pilularis*, and *Typha domingensis*. These stands are widely scattered in association with canyons and drainages and therefore are a minor part of the vegetation. Willows occur in only five isolated locations. Like other woody vegetation on the islands, these woodlands are recovering from past disturbances and should be monitored.

MONITORING LOCATIONS

Permanent transects were established in representative plant communities. These transects form the basis for measuring specific parameters associated with vegetation attributes. A total of 54 transects were established; 22 on Santa Barbara Island, 16 on Anacapa Island, and 16 on San Miguel Island at the general locations indicated in Figures A-1, A-2, and A-3. (See Appendix A for specific transect locations, site descriptions, and detailed maps for locating marking stakes.) Where appropriate, transects that were established by the Santa Barbara Botanical Garden in 1978 have been incorporated into transect design and placement.

When it is necessary to relocate an old transect or establish a new one, transects should be established that: 1) provide adequate representation of the variety of plant communities discussed, 2) lie entirely within one basic slope exposure (transects should not include facing slopes on both sides of a canyon), 3) run either true north-south or east-west, and 4) are 30 m long. New transects should be marked at each end with angled aluminum stakes.

MONITORING PROTOCOL

SAMPLING METHODS

The vegetation monitoring program uses two methods to monitor changes in vegetation communities -- periodic vegetation mapping and monitoring of permanent transects.

Periodic Vegetation Mapping

Vegetation communities are mapped approximately every five year to note changes in overall vegetation patterns. Mapping is based on aerial photographs taken in the early spring. Vegetation mapping is accomplished through interpretation of 9-inch format, false color infra-red transparencies at an approximate scale of 1:12,000 with complete stereoscopic coverage. A comparison is made between previous vegetation maps and present conditions. Any changes in community boundaries should be highlighted on the new vegetation map.

Permanent Transects

Purpose

The vegetation monitoring program uses a point-intercept method (30-m, 100 point transects) to sample and quantify island vegetation. This method records species and their height occurring at regular, predetermined intervals along the transect. Ecological attributes that can be quantified from this method include species composition, frequency of occurrence, height, and cover.

Schedule

Data are collected from all vegetation monitoring sites once each year for the foreseeable future. Because the vegetation is going through a phase of recovery from herbivore grazing, it is quite dynamic. "Normal" limits of variation have not yet been determined and will be defined over time as the vegetation responds to the unpredictable and highly variable amount of annual rainfall.

Sites are visited and information recorded during the growing season, preferably in late January through mid-April. Trips are scheduled to visit Santa Barbara Island first, Anacapa Island second, and San Miguel Island third because of the progression of season and the fact that Santa Barbara is normally warmer and dries out earlier than the northern islands.

Allow six to seven days to conduct the monitoring on each island including two days for travel. The transects can be read by two people in four days for each island if species identifications are known. Allow an additional four days in the office for transfer of each island's data from field sheets to computer files, and for running analyses, filing, and wrap-up.

Approximately 30 days prior to a planned trip, make arrangements with the scheduling officer for transportation (boat, plane, or helicopter) and for bunk space. There is usually heavy pressure for these resources in the spring of the year, so be prepared to compromise if others need to be on that island also.

About one week prior to a scheduled trip, schedule a meeting with those involved to determine that all equipment is in order and available and to plan meals and grocery purchases.

Personnel

Two people are needed for each transect. One must be able to recognize species and identify plants down to subspecies or varieties. The other person serves as helper and data recorder. It is very helpful if the second person also has some familiarity with the island flora. A number of people are listed in Appendix B who are knowledgeable about the sampling methods and island flora and who will assist in solving problems that may arise.

Sampling Equipment and Materials

Vegetation monitoring requires a minimum of equipment and materials. In addition to the handbook, the following equipment and supplies are needed.

Data forms (Appendix C)
Pencils
Clipboard
Species lists, Munz California Flora and Field Guides as desired
Compass
150-m or 300-ft. measuring tape
25-cm (1") diameter PVC pipe measuring rod or range pole
Camera in a pelican case
First Aid kit

Personal Gear
- Hiking boots
- Day pack
- Camping gear, including sleeping bag (tents are required on Middle and West Anacapa and a small camp stove may be desired)
- Rain and wind gear
- Sun glasses, hat or cap, and sunscreen lotion
- Flashlight
- Notebook
- Camera
- Binoculars
- Water bottle
- Food and drink

Sampling Procedures

Take data sheets, measuring pole, and tape measure to each transect location. Determine which end of the transect is the starting point from the site description and then stretch the tape out accordingly. After the tape is down, the person who will identify species (reporter) takes the measuring pole and places it 30 cm or 1 foot from the end stake. While the helper records data, the species reporter calls out first the highest point on the pole touched by vegetation and then name or code of that tallest species. The reporter then calls off all other species which touch the pole. If there is no vegetation at any point, the reporter tells the recorder that there is none and identifies the unvegetated substrate (bare soil, rock, or litter). The pole is then dropped at the next sample point, 30 cm (1 foot) down the tape and another point is read. Continue this process until the entire transect is read. Before leaving the site, photograph the site from two directions using slide film and make notes concerning any outstanding or unusual circumstance involving the transect or that part of the island.

DATA MANAGEMENT

Vegetation monitoring data is stored and analyzed by computer using the program TRANSECT. This program calculates percent frequency for species in the sample and creates tables and figures to compare transect data over time or space. The program was designed specifically for data needs of this monitoring program. Field methods and data sheets have been designed to make data entry accurate and efficient.

TRANSECT is a menu driven program and is largely self explanatory. A brief summary of the specific subroutines of the program is presented here. The guide "Transect--A computer program for vegetation analysis" is included in Appendix G and explains other subroutines that may become useful.

To Begin

The TRANSECT program is loaded on computer. To use it follow the procedure:

turn on the computer
from SYSTEM ACCESS MENU type <b><cr>
from DATABASE MANAGEMENT SYSTEMS
MENU type <99><cr>

The screen will display Vegetation Line-Transect Analysis Program MAIN MENU.

Species Code Lists

TRANSECT operates on a list of four character codes denoting species encountered in vegetation monitoring transects. This species/code list is stored on diskette under the filename TRANFLOR.LST and is also found in appendix D. It contains all species present in vegetation transects monitored since 1984. Check raw field data for new species not already on the list and add them to the list before running results.

Additions to the TRANFLOR.LST file are made in the following way:

MAIN MENU
Species/Code Menu
LOAD species/code file
EDIT species/code file
<A>dd
or
<C>hange
SAVE present species/code to file
PRINT list
<q>uit to DOS
C:\VEG>SORT<TRANFLOR.LST>TRANFLOR.LST
MAIN MENU
Species/Code Menu
LOAD species/code file

Load the species/code list from the disk into working memory. The results and comparative analysis will not operate unless the list resides in working memory. Unless you are working in DOS, the three letter extension must be omitted when typing filenames. The TRANSECT program assumes the proper extension for each program module.

The EDIT module allows a variety of manipulations. New species are added to the list under the EDIT subroutine (select <A>dd). These added species will simply be appended to the end of the list. They can be sorted into alphabetical order by exiting TRANSECT and at the DOS prompt sorting the list. <C>hange is used to correct spelling and other input errors. At the prompt, type the species entry number which can be read off the species code printout or locate using the <S>earch subroutine. Remember to save and print a working copy for reference.

Data Entry

The procedure to store data on the computer requires the following steps:

MAIN MENU
Plot Data Menu
Input PLOT TEXT data
Set Function Keys to common species codes
Input PLOT DATA
SAVE present plot data to file
PRINT plot data
(then if necessary...)
EDIT plot data
SAVE plot data
PRINT plot data

The information entered in Plot Text is standardized and based on the completed field data sheets (Appendix E). At the prompt for location, type transect filename (eg. EAI0187). Next, enter the date the transect was sampled. Use the format date, three letter abbreviated month, and year (eg. 08MAY 87). Other methods to type the date may not fit the format of the graph subroutine. Under Miscellaneous Note #1 enter the initials of the investigators who identified the species and recorded the data (eg. CMD and JLL).

Enter the direction in which the transect was sampled under miscellaneous notes #2 (eg. "Transect read W to E"). Regardless of how the data was collected be sure to enter data from the predetermined starting point so that the height profiles can be easily compared. Other notes may follow. Errors may be corrected only by re-entering the entire text.

Before entering data, it is useful to set Function Keys to the common codes in the transect. F keys can also be coded for a combination of codes, eg. F1 = COGI, F2 = HOGL, F3 = COGI/HOGL. Use of the F key speeds data entry and reduces the chance for typing errors.

In **Data Input** there are several important points to remember. Check that the heights recorded are in meters and remember to enter decimal points. No height entered (type <cr>) places a zero on the data file. Be certain that the species codes are entered from tallest to shortest. Slashes must be typed between codes (eg. COGI/ARCA/HOGL). Points entered can be edited but not removed from the count. For example, if you type in extra data accidentally creating 102 points in a 100 point transect, you can erase the data for points 101 and 102, but the program will still analyze the data as if there were 102 total points. Starting over is the only method to correct this error within the present version of the program.

After exiting data input, use the <A>dd subroutine of the Edit module to continue entering data. The input subroutine will only allow you to start from the beginning.

Save the data input to store it on disk. The computer will hold the input in memory as long as the machine is on and no new transect data entered. Be careful to save the data to the correct filename. The program will append the filename you enter with .DAT. It will also create the .TXT (text) file for the same transect. The program will not successfully store the file unless the text data has been entered. If you forget to enter text, the program will use text currently in memory, inserting information from the previous transect entered.

Print the plot data to check for accuracy (see appendix F, example of printout of TRANSECT plot data file). The current version of the TRANSECT program does not allow you to view a file except by generating a printout.

Edit the plot data by entering the Edit module. The input is edited one point at a time. For a single error, use the <C>hange subroutine, which asks for the point number. Simply type in the correct data. If you call up the wrong point, be sure to re-enter the same correct data displayed, or else a zero height will be entered and the correct codes will be erased. To correct a systematic error, use of the <G>lobal replacement or deletion can be especially time saving. Again, save the revised version of the raw data and make a new printout.

Generating Results

Result files must exist to run the comparative analysis module.

MAIN MENU
- Results File Menu
  - Create results file
    - Create results file from raw data
  - Edit results file
    - <L>ist results

Load the species/code file prior to running results. Simply enter the data file to process at the computer prompt. Results will be calculated and a new file with the extension .RSL will be created. Check the file by <L>isting it. Make sure that all the species entered are displayed. If any are missing, they were not found on the species/code list.

DOS Commands to Store and Retrieve Files

All data (.DAT), text (.TXT), and results (.RSL) files are stored on diskettes. Ten double-sided, double-density diskettes are used for storage. One disk stores the TRANSECT program and the species code list. Each island has files stored on three diskettes; one each for .DAT, .RSL, and .TXT files. To record the time data is entered, make new files daily. For example, all of the Anacapa Island data files can be copied with the procedure:

<q>uit TRANSECT
place the diskette EMW Anacapa DATA in disk drive A
at the DOS prompt C:\VEG>
type <COPY C:\VEG\?AI*.DATA A:>

The <?> stands in for East, West, and Middle; the <*> for #<01>...<06> transects and <84>...year. This command will copy all files on all

the Anacapa islets for all years. One could replace the <?> and <*> with the specific file information and copy one file at a time. The same procedure is used for .RSL and .TXT files, and then for the other islands.

After the data has been entered and a results file created, an analysis can be run. Result files from previous years data must be retrieved from the storage floppy diskettes and transferred to the computer hard disk. Follow the procedure:

<q>uit TRANSECT
place the diskette RESULTS in disk drive A
at the DOS prompt C:\VEG> type
<COPY A:*.* C\VEG>
repeat this procedure for each diskette until all necessary .RSL files have been copied.

Data Analysis

The analysis module of TRANSECT allows resource managers to detect and track change in the composition and frequency of species, and in the physical structure of the plant communities sampled. The TRANSECT program has several methods to analyze data. A complete description of options is found in the program guide. Generally only the following subroutines will be used.

MAIN MENU
Analysis Menu
COMPARATIVE analysis
create List of filenames to analyze
analyze for <F>requency
create Table
enter TEXT information
create Graph
enter TEXT information
List species codes to compare
HEIGHT GRAPH
enter file to process
enter scale to use

Comparative analysis module works on result (.RSL) files. When prompted, enter the earliest .RSL file for a given transect (eg. <SBI0184><CR>) and then each successive year to the present. A null <CR> ends the list. When presented the choice, choose to analyze <F>requency. Then choose to make a table printout (an example is found in Appendix F - table printout of frequency data). The program will request text information which can be copied from the previous years summary table. For example:

TRANSECT #
type <SANTA BARBARA ISLAND 01>
TRANSECT LOCATION
<CR> leave this blank
OF POINTS
<100>
Footnote #1
<No data taken in 1986>
Footnote #2
<101 points read in 1987>

After the text is entered a null <CR> will start the printer. The computer will return to the prompt to choose between Table or Graph; choose Graph. Follow this procedure to keep the same text as just entered. If another procedure is followed, the text may need to be entered again. The program will then prompt for the species codes to track over the years entered. These codes were established and should be copied from the 1987 analysis. Remember to advance the paper in the printer between each printout. (See Appendix F, example of graph printout of frequency data).

Print a height graph for data from the current year (see Appendix F, example of graph printout of height data). The computer will request which .DAT file to process and then what scale to use. Generally use the scale already used for the previous years profile figures. The profile can be reduced on the copier by 50% and cut to fit on the earlier profile figures for comparison.

Reporting

Data is analyzed using the above procedures each field season. A report is then prepared which includes summary tables and graphs for each transect along with any explanatory information as appropriate. Changes, trends, and patterns are highlighted for sites. Concurrent with the updating of vegetation mapping every five years (or more frequently if needed), a careful evaluation of all data, changes, and trends and the statistical significance of changes should be undertaken by park scientists. Findings should be summarized and additional questions posed for research and experimental study as needed.

LITERATURE CITED

Hochberg, M. L., S. Junak, R. Philbrick, and S. Timbrook. 1979. Botany. pp. 5.1-5.91. *In*: D. M. Power (ed.) Natural Resources Study of the Channel Islands National Monument, California. Santa Barbara Museum of Natural History, Santa Barbara, CA.

Munz, P. A. 1968. A California Flora and Supplement. University of California Press. Berkeley, CA.

APPENDIX A. Vegetation Monitoring Transect Site Descriptions

This appendix contains specific information on each monitoring transect including individual site descriptions, common species at each site, and detailed maps for finding the marking stakes at each site. An island-wide map preceeds the transect site descriptions for each island to provide general locations. For ease in locating specific site descriptions, they are found on the following pages in numerical order by transect for each island.

NOTE: All compass bearings to transect stakes in the following section are true (not magnetic) readings.

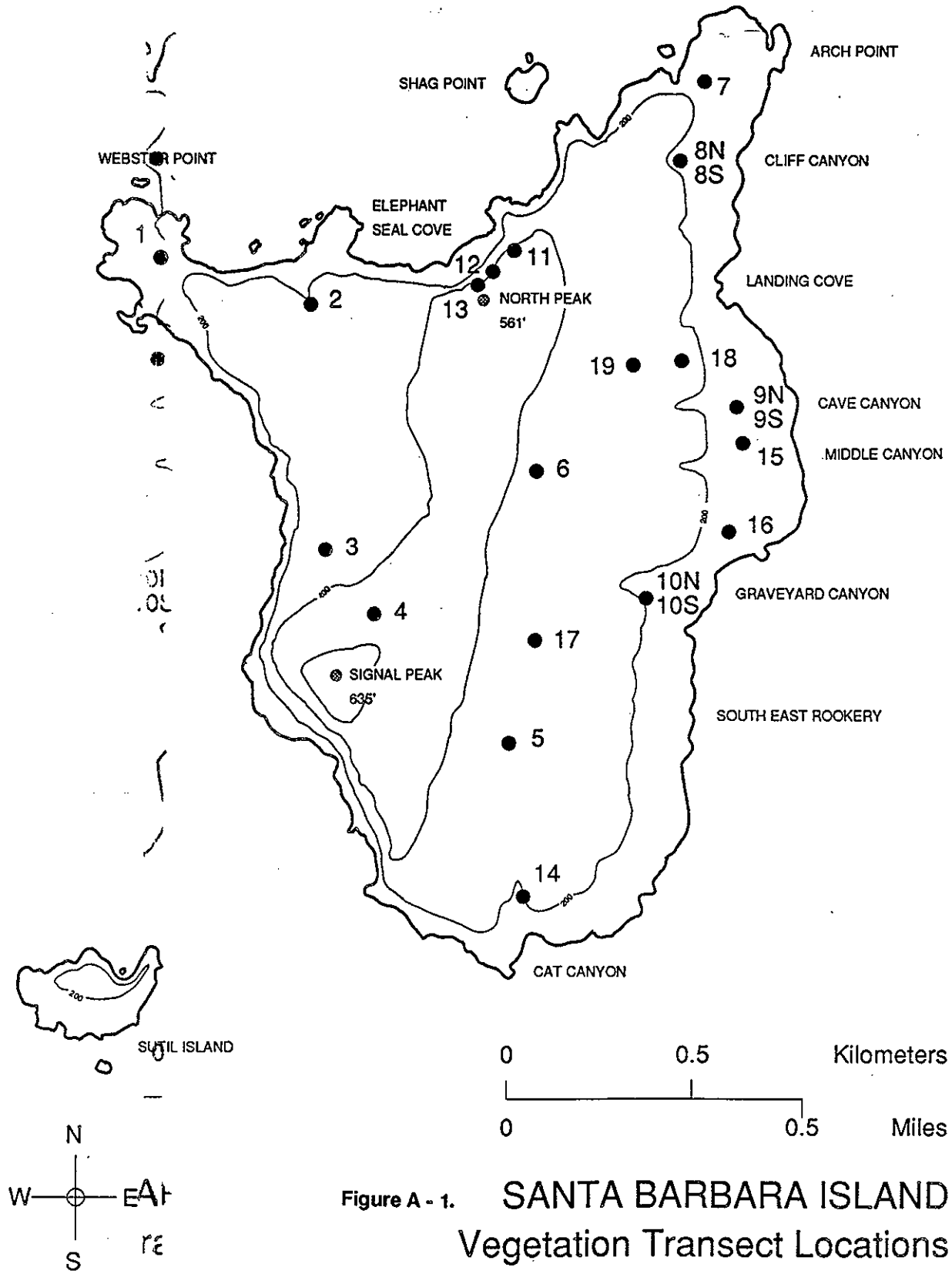


Figure A - 1. SANTA BARBARA ISLAND
Vegetation Transect Locations

VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 01

TRANSECT LOCATION: Bench just above Webster Point.

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 130

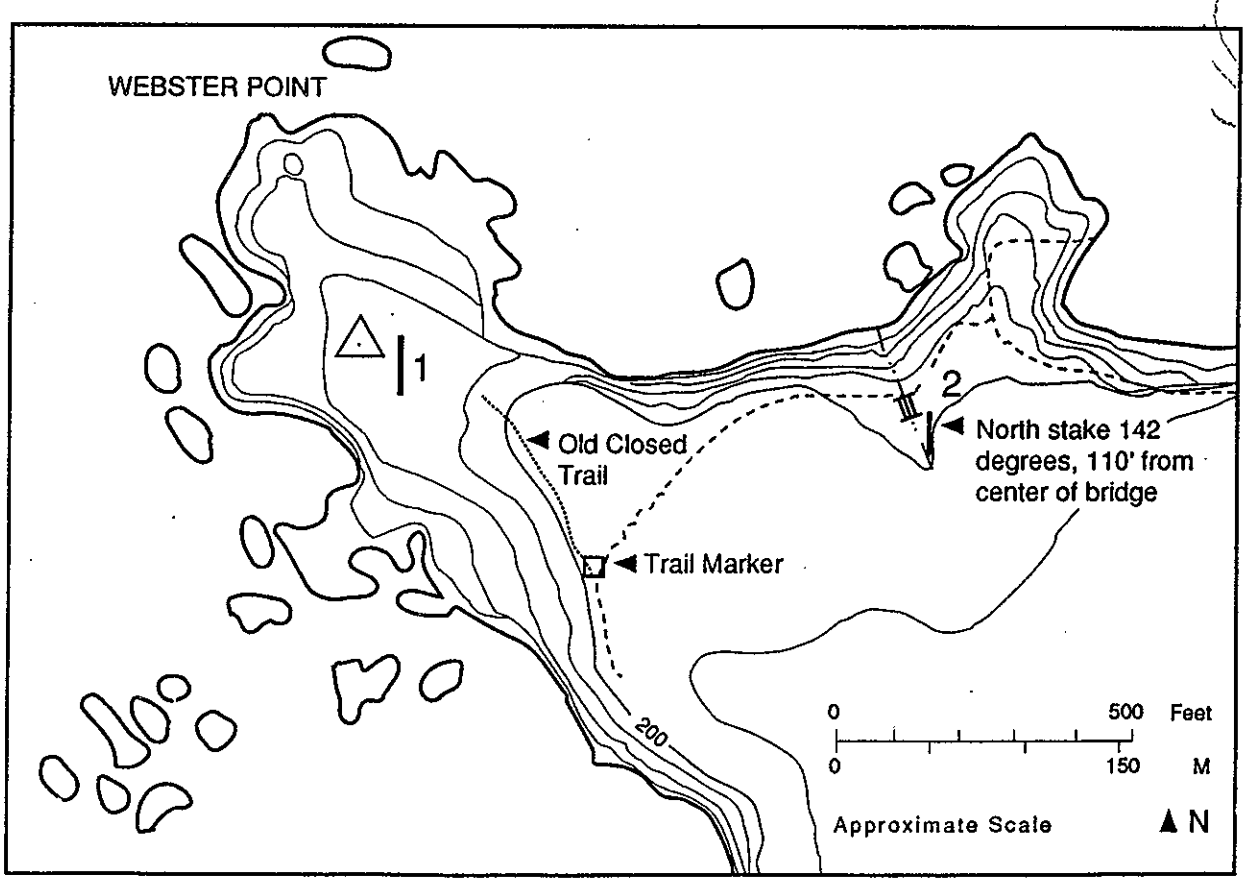
DOMINANT SPECIES: Grassland/annual iceplant

ELEVATION: 175 ft.

SLOPE ASPECT: 290° SLOPE: 0°

SPECIES AND CODES:

SUCA	*Suaeda californica*	ATSE	*Atriplex semibaccata*
HOGL	*Hordeum murinum* ssp. *glaucum*	PAIN	*Parapholis incurva*
MECR	*Mesembryanthemum crystallinum*	SOOL	*Sonchus oleraceus*
AMPU	*Amblyopappus pusillus*	CHMU	*Chenopodium murale*
AMIN	*Amsinkia intermedia*	MENO	*Mesembryanthemum nodiflorum*
LACH	*Lasthenia chrysostoma*		



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 02

TRANSECT LOCATION: South of trail to Elephant Seal Cove

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 130

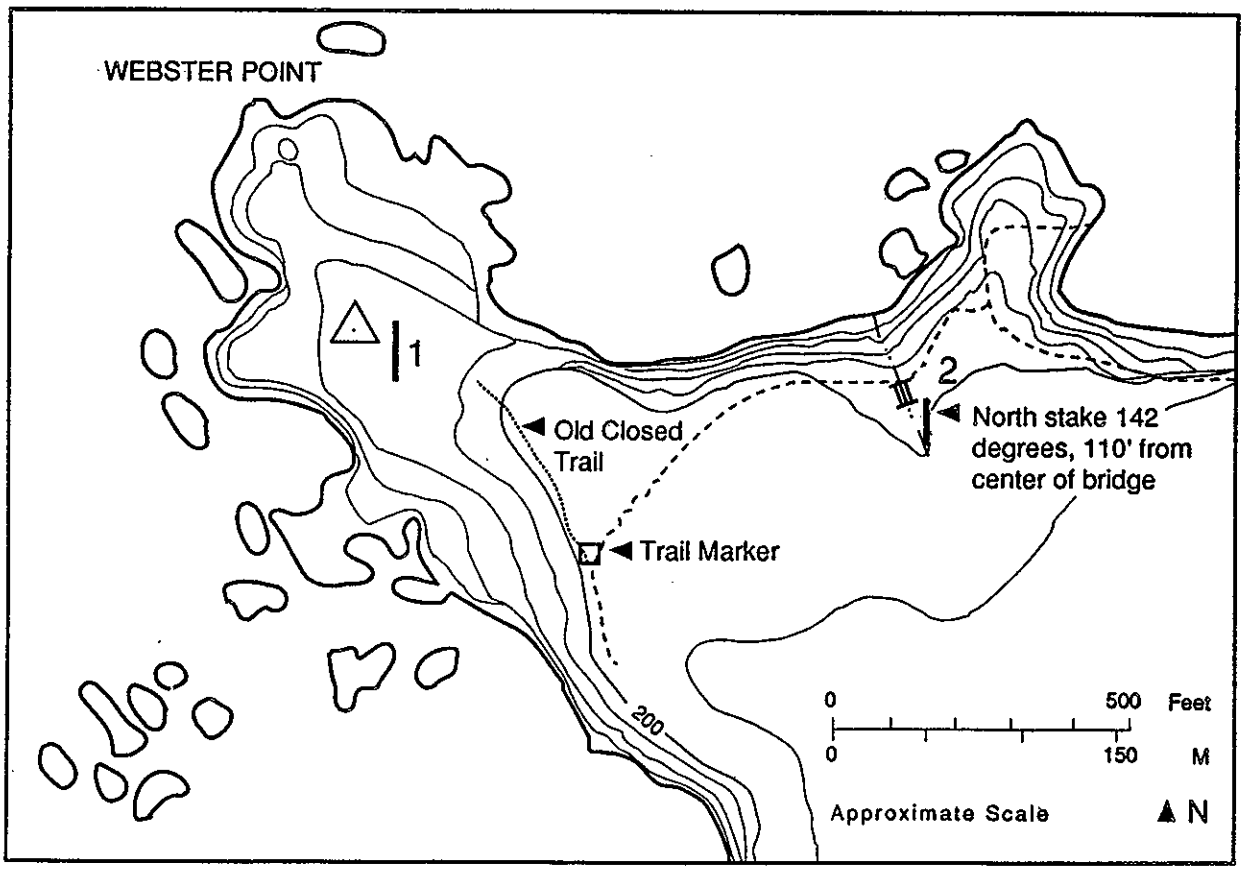
PLANT COMMUNITY: Grassland/annual iceplant

ELEVATION: 190 ft.

SLOPE ASPECT: W(270°) SLOPE: 3°

SPECIES AND CODES:

SUCA *Suaeda californica*
HOGL *Hordeum murinum* ssp. *glaucum*
MECR *Mesembryanthemum crystallinum*
AVFA *Avena fatua*
SOOL *Sonchus oleraceus*
AMPU *Amblyopappus pusillus*
MENO *Mesembryanthemum nodiflorum*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 03

TRANSECT LOCATION: North of trail to Webster Point as it descends from the saddle. Transect below trail, above washout swale.

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 132

PLANT COMMUNITY: Sea-blite scrub

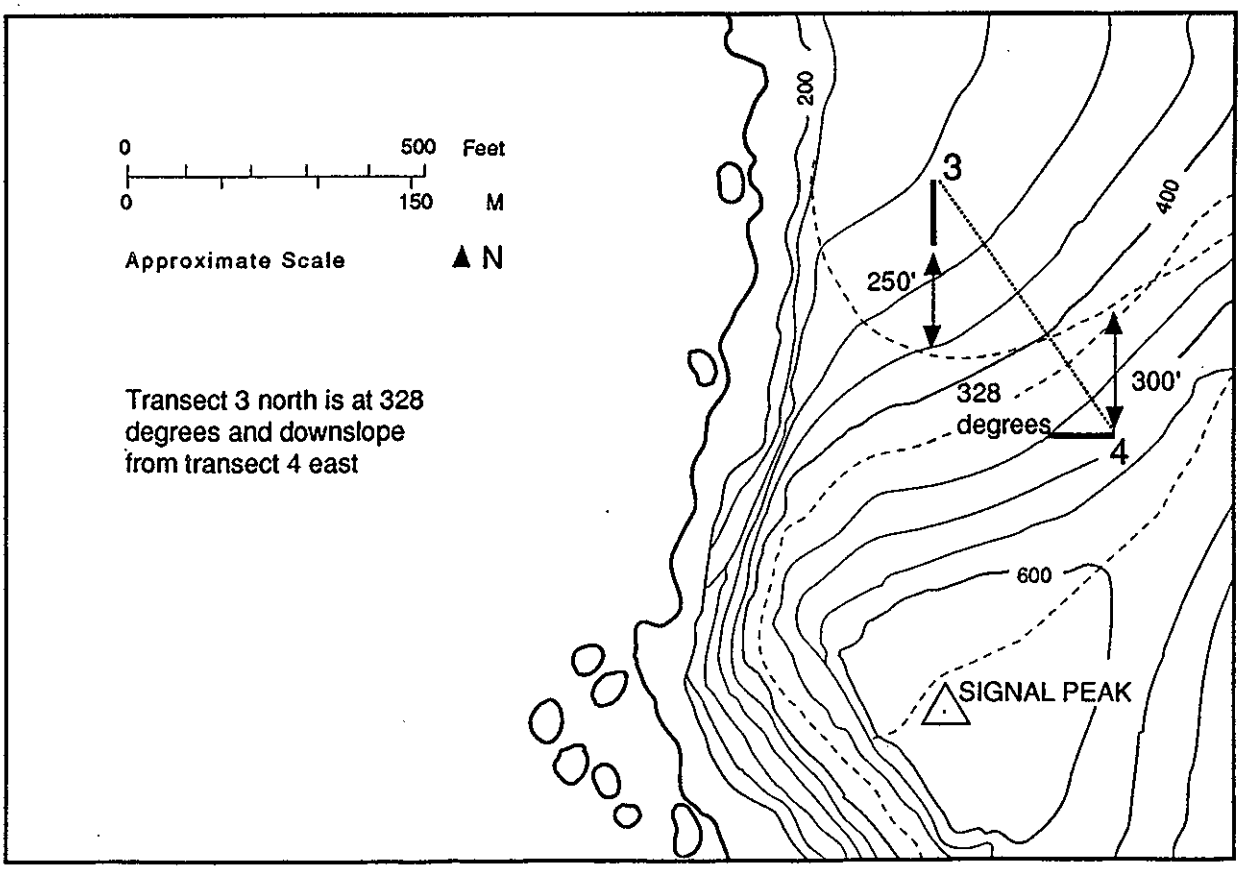
ELEVATION: 320 ft.

SLOPE ASPECT: 284°

SLOPE: 3°

SPECIES AND CODES:

HOGL	*Hordeum murinum* ssp. *glaucum*	AMIN	*Amsinkia intermedia*
MECR	*Mesembryanthemum crystallinum*	ATSE	*Atriplex semibaccata*
SUCA	*Suaeda californica*	AVFA	*Avena fatua*
SOOL	*Sonchus oleraceus*	CHMU	*Chenopodium murale*
MAPA	*Malva parviflora*		



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 04

TRANSECT LOCATION: On north slope of Signal Peak, south of trail to Webster Point

TRANSECT SAMPLE DIRECTION: E-W

NUMBER OF POINTS: 100

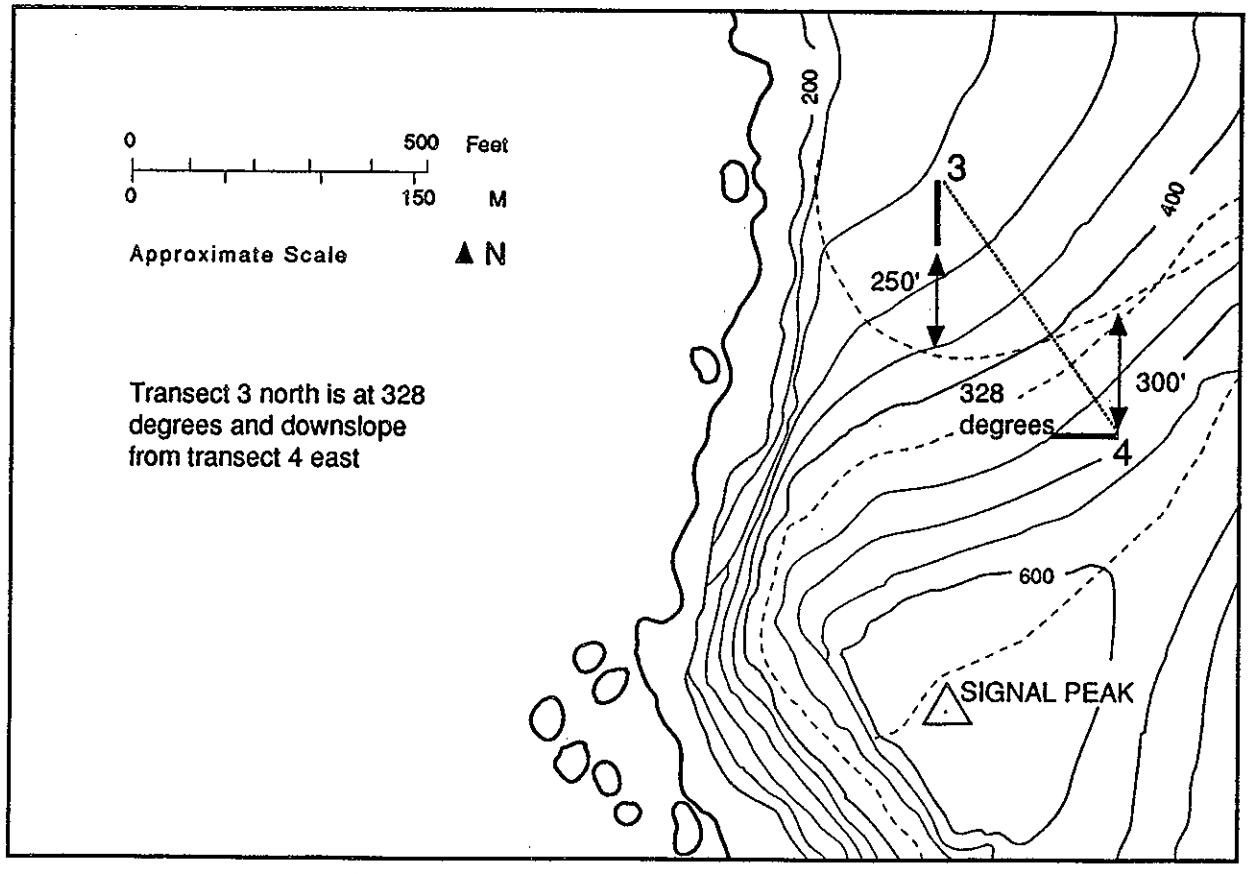
PLANT COMMUNITY: Sea-blite scrub

ELEVATION: 480 ft.

SLOPE ASPECT: 354° SLOPE: 19°

SPECIES AND CODES:

HOGL	*Hordeum murinum* ssp. *glaucum*	CLPE	*Claytonia perfoliata*
SUCA	*Suaeda californica*	MECR	*Mesembryanthemum crystallinum*
AMIN	*Amsinkia intermedia*	AVFA	*Avena fatua*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 05

TRANSECT LOCATION: East slope of Signal Peak, southwest of the of Badlands

TRANSECT SAMPLE DIRECTION: E-W

NUMBER OF POINTS: 100

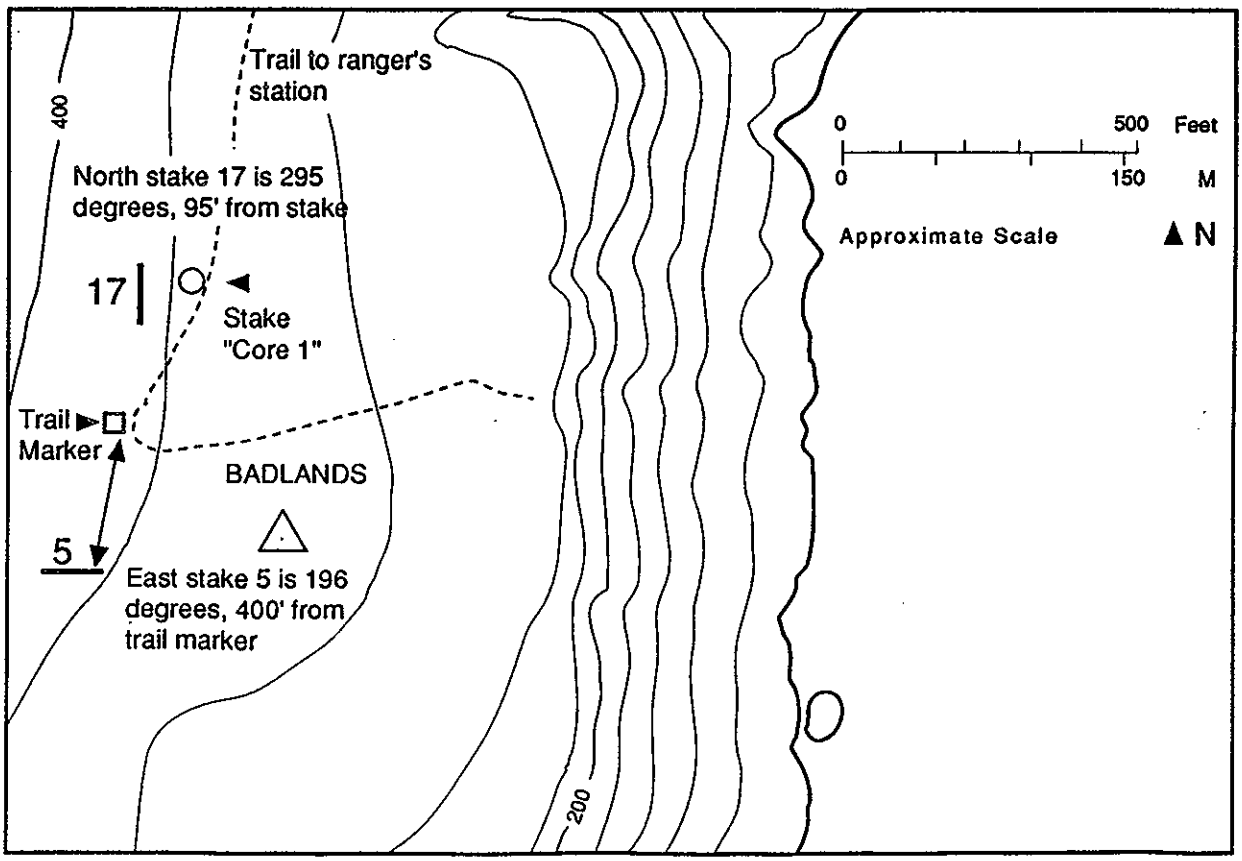
PLANT COMMUNITY: Sea-blite scrub

ELEVATION: 360 ft.

SLOPE ASPECT: 110° SLOPE: 8°

SPECIES AND CODES:

HOGL *Hordeum murinum* ssp. *glaucum*
SUCA *Suaeda californica*
MENO *Mesembryanthemum nodiflorum*
MECR *Mesembryanthemum crystallinum*
MAPA *Malva parviflora*
SOOL *Sonchus oleraceus*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 06

TRANSECT LOCATION: Southwest of Badlands Trail Loop junction with Signal Peak trail

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

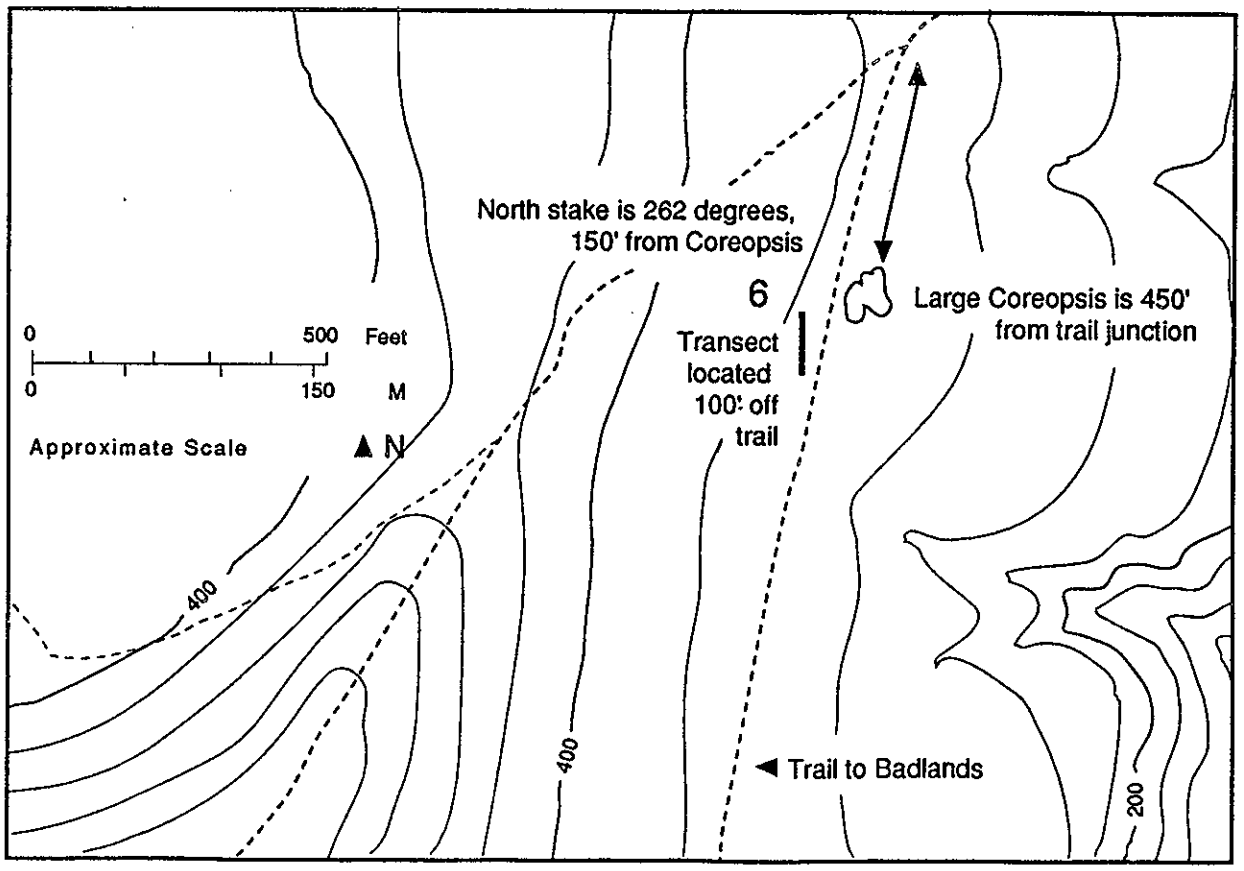
PLANT COMMUNITY: Grassland

ELEVATION: 360 ft.

SLOPE ASPECT: 115° SLOPE: 5°

SPECIES AND CODES:

AVFA	*Avena fatua*	AMIN	*Amsinkia intermedia*
BRMO	*Bromus mollis*	HOGL	*Hordeum murinum* ssp. *glaucum*
ATSE	*Atriplex semibaccata*	ERMO	*Erodium moschatum*
SOOL	*Sonchus oleraceus*	MAPA	*Malva parviflora*
BRRU	*Bromus rubens*	AVBA	*Avena barbata*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 07

TRANSECT LOCATION: Arch Point, south of Lighthouse, just west of trail

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

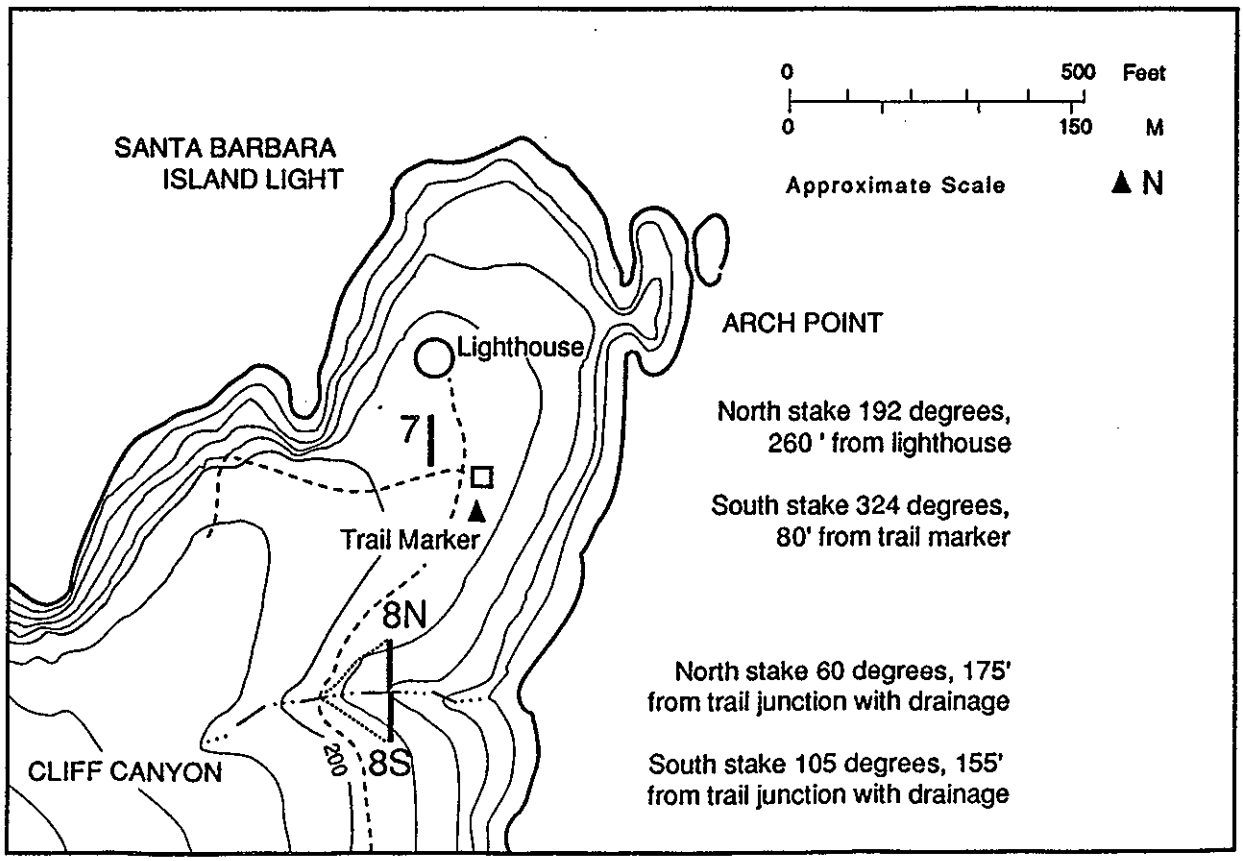
PLANT COMMUNITY: Sea cliff scrub

ELEVATION: 180 ft.

SLOPE ASPECT: 20° SLOPE: 3°

SPECIES AND CODES:

MECR	*Mesembryanthemum crystallinum*	ATSE	*Atriplex semibaccata*
LACH	*Lasthenia chrysostoma*	MENO	*Mesembryanthemum nodiflorum*
MAPH	*Malacothrix philbrickii*	AMIN	*Amsinkia intermedia*
ATCA	*Atriplex californica*	AMPU	*Amblyopappus pusillus*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 8N

TRANSECT LOCATION: Cliff Canyon, below trail. North half of a transect established by Santa Barbara Botanical Garden

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 67

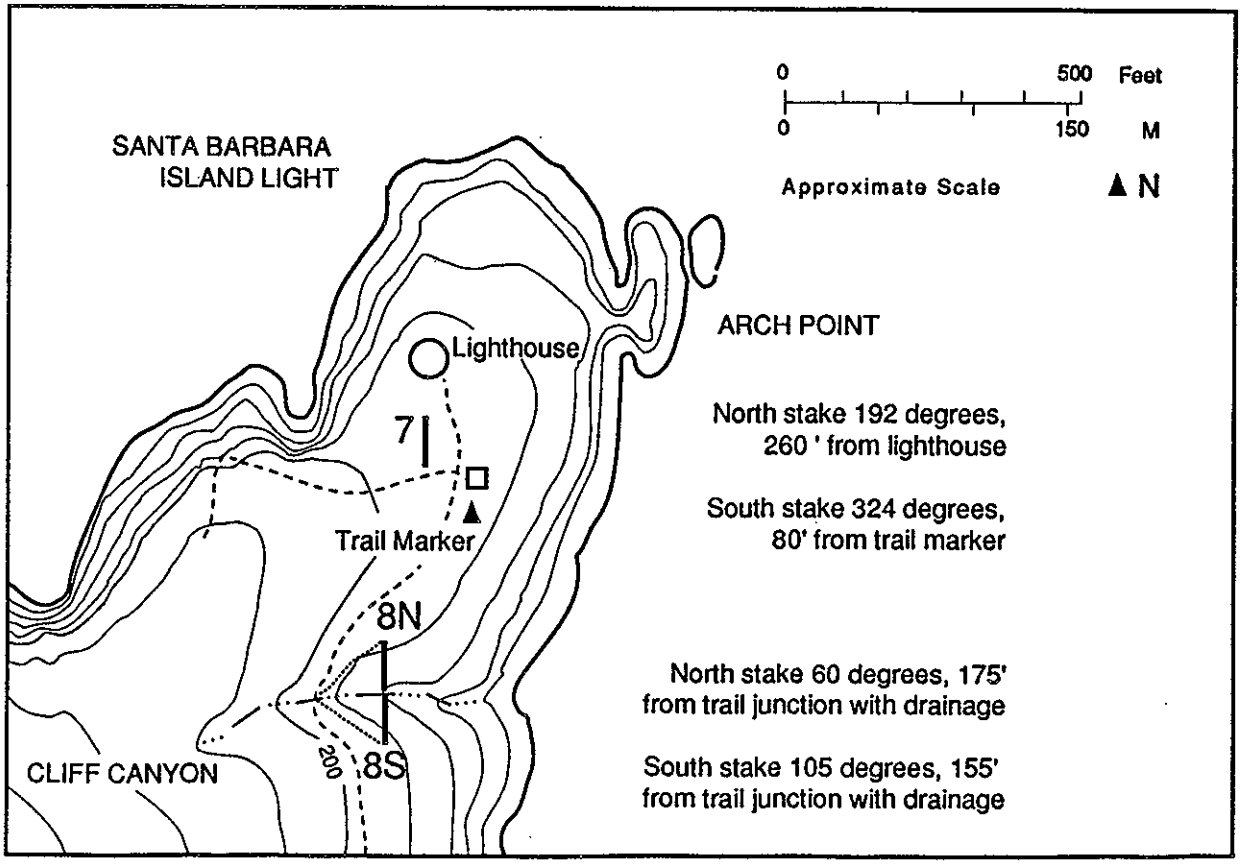
PLANT COMMUNITY: Boxthorn scrub

ELEVATION: 120 ft.

SLOPE ASPECT: 170° SLOPE: 24-33°

SPECIES AND CODES:

MECR	*Mesembryanthemum crystallinum*	MAPA	*Malva parviflora*
ATSE	*Atriplex semibaccata*	CRCL	*Cryptantha clevelandii*
AMPU	*Amblyopappus pusillus*	HOGL	*Hordeum murinum* ssp. *glaucum*
LYCA	*Lycium californicum*	SOOL	*Sonchus oleraceus*
OPPR	*Opuntia prolifera*	CHMU	*Chenopodium murale*
AMIN	*Amsinkia intermedia*		



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 8S

TRANSECT LOCATION: Cliff Canyon. South end of transect established by Santa Barbara Botanical Garden

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 65

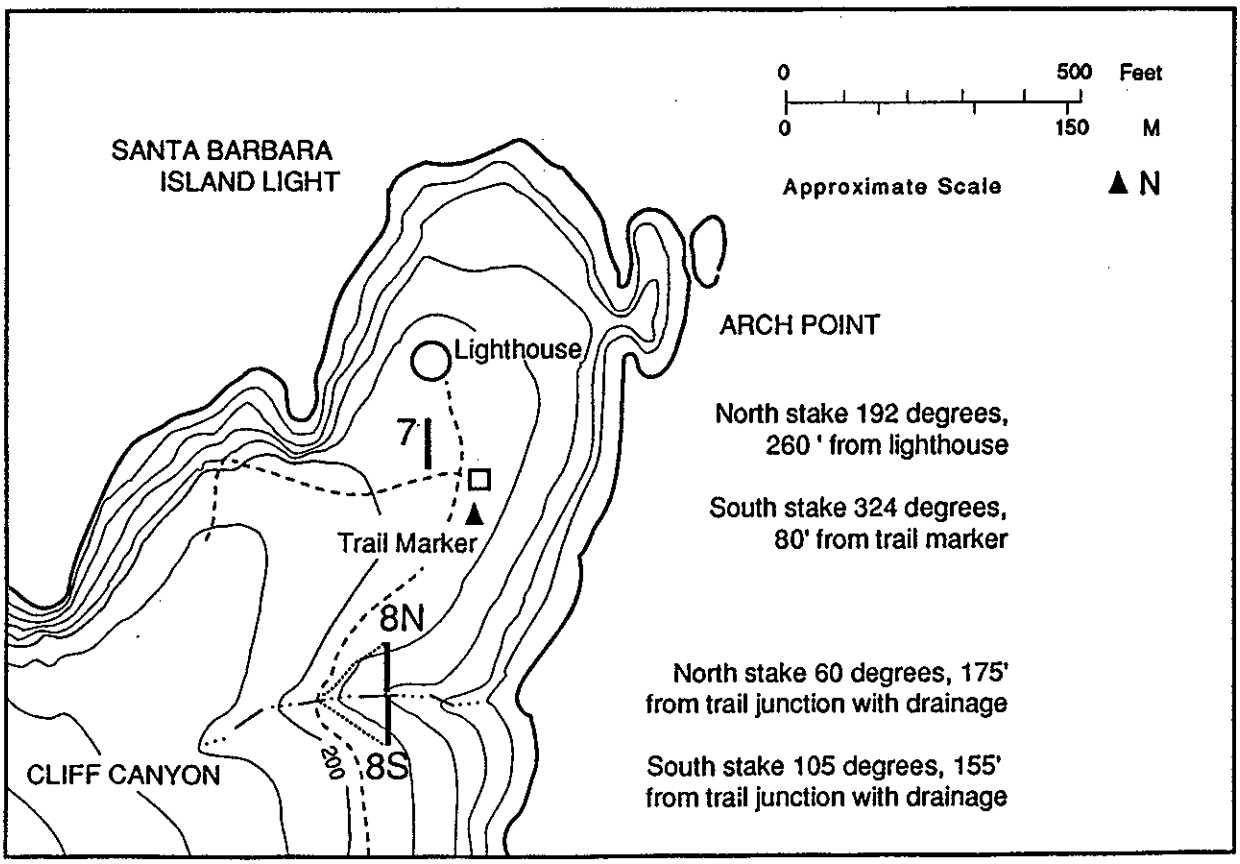
PLANT COMMUNITY: Sea cliff scrub

ELEVATION: 120 ft.

SLOPE ASPECT: ca. 20° SLOPE: ca. 30°

SPECIES AND CODES:

HOGL	*Hordeum murinum* ssp. *glaucum*	DIPU	*Dichelostemma pulchella*
PTDR	*Pterostegia drymarioides*	ERMO	*Erodium moschatum*
LACH	*Lasthenia chrysostoma*	SOOL	*Sonchus oleraceus*
ATCA	*Atriplex californica*	PLCA	*Platystemmon californicus*
AMIN	*Amsinkia intermedia*	MECR	*Mesembryanthemum crystallinum*
CLPE	*Claytonia perfoliata*	MAPH	*Malacothrix philbrickii*
ATSE	*Atriplex semibaccata*	MAMA	*Marah macrocarpa*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 9N

TRANSECT LOCATION: In Cave Canyon, across trail from marker #4

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 75

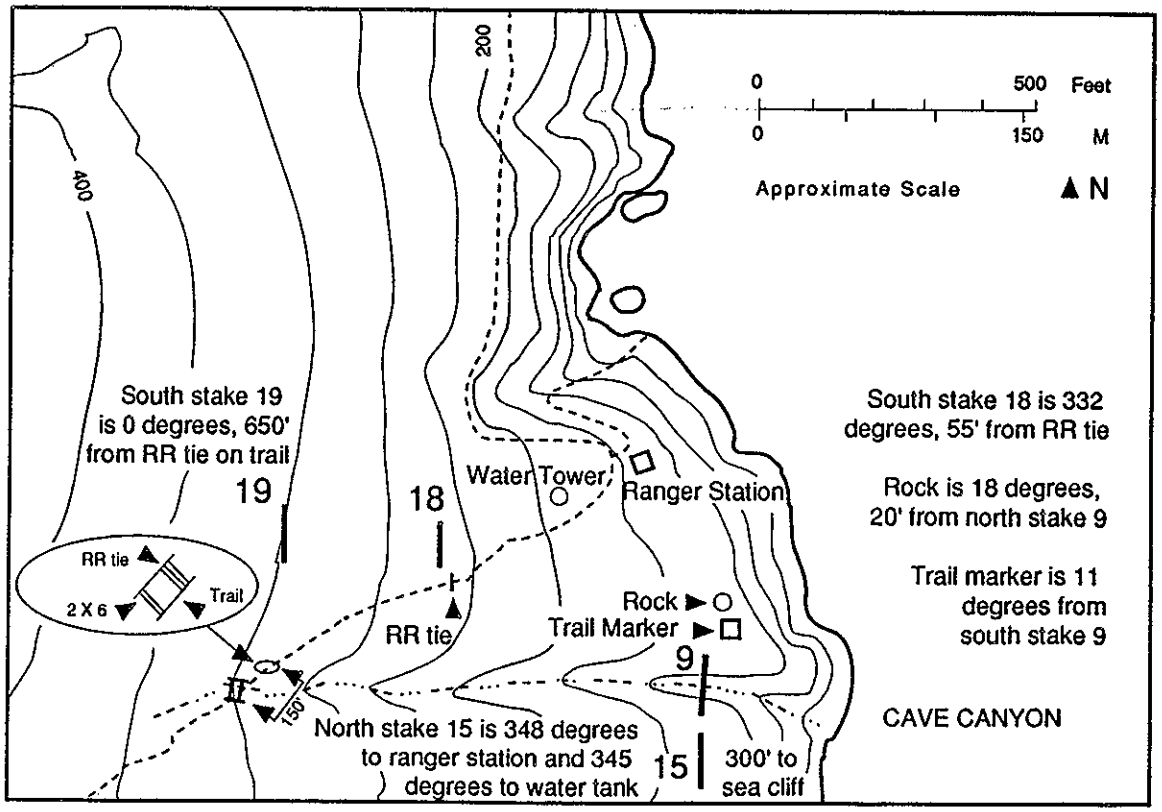
PLANT COMMUNITY: Maritime cactus scrub

ELEVATION: 120 ft.

SLOPE ASPECT: 172° SLOPE: 12°

SPECIES AND CODES:

OPLI	*Opuntia littoralis*
BRRU	*Bromus rubens*
MUMI	*Muhlenbergia microsperma*
AVFA	*Avena fatua*
MAMA	*Marah macrocarpa*
COGI	*Coreopsis gigantea*
CAMA	*Caylstegia macrostegia*
ATSE	*Atriplex semibaccata*
AMPU	*Amblyopappus pusillus*
ACMI	*Achillea millefolium*
HOGL	*Hordeum murinum* ssp. *glaucum*
HECL	*Hemizonia clementina*
PEEM	*Perityle emoryi*
MAPA	*Malva parviflora*
PHRA	*Pholistoma racemosum*
PHAU	*Pholistoma auritum*
PTDR	*Pterostegia drymarioides*
AMIN	*Amsinkia intermedia*
CHCA	*Chenopodium californicum*
DIPU	*Dichelostemma pulchella*
MECR	*Mesembryanthemum crystallinum*
PHDI	*Phacelia distans*
LAAU	*Lamarkia aurea*
SOOL	*Sonchus oleraceus*
AVBA	*Avena barbata*
BRAR	*Bromus arizonicus*
CLPE	*Claytonia perfoliata*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 9S

TRANSECT LOCATION: North facing slope of Cave Canyon, just south of and in line with SBI9N.

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 55

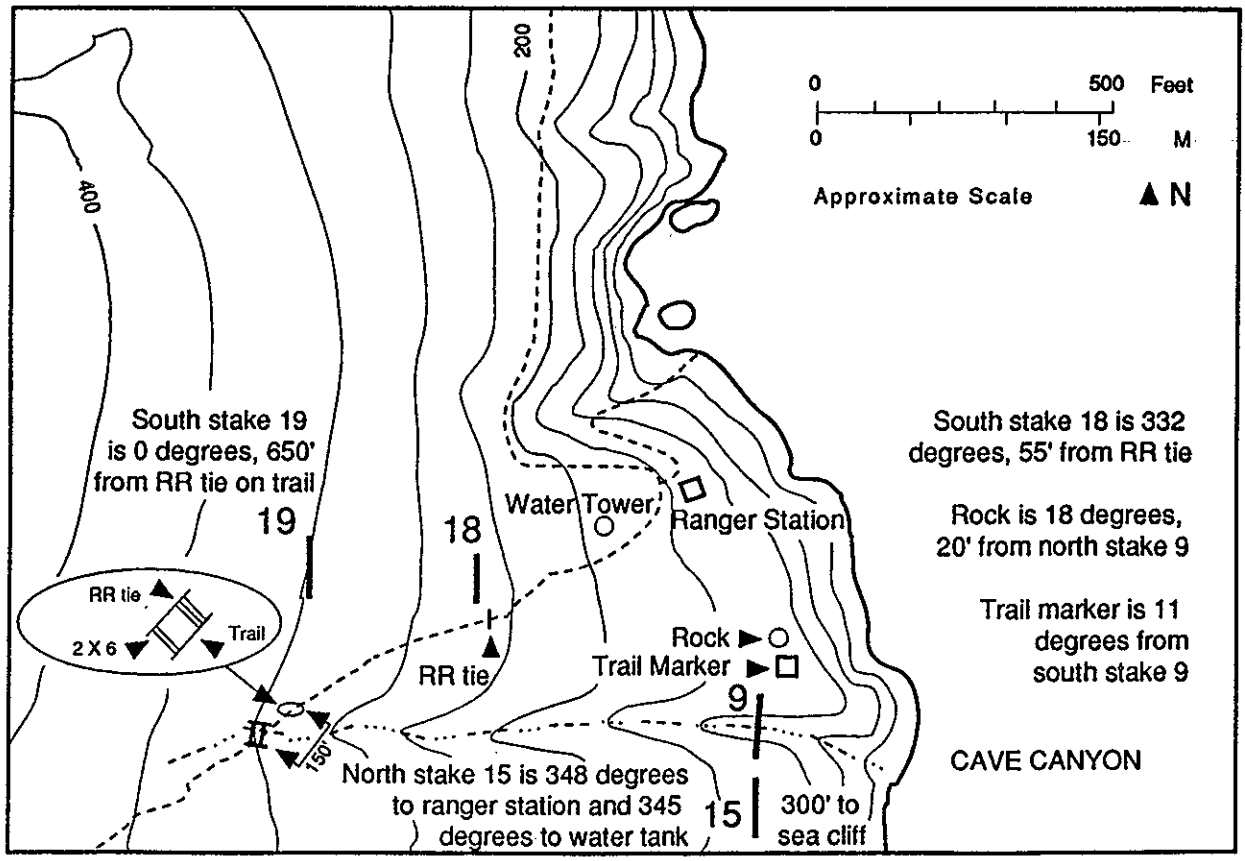
PLANT COMMUNITY: *Coreopsis* scrub

ELEVATION: 160 ft.

SLOPE ASPECT: 12° SLOPE: 29°

SPECIES AND CODES:

BRRU	*Bromus rubens*
MAMA	*Marah macrocarpa*
COGI	*Coreopsis gigantea*
CLPE	*Claytonia perfoliata*
CAMA	*Calystegia macrostegia*
ACMI	*Achillea millefolium*
PHRA	*Pholistoma racemosum*
MEIM	*Melica imperfecta*
AVBA	*Avena barbata*
AVFA	*Avena fatua*
BRMO	*Bromus mollis*
DIPU	*Dichelostemma pulchella*
BRAR	*Bromus arizonicus*
HOGL	*Hordeum murinum* ssp. *glaucum*
SCAN	*Scleranthus annuus*
SOOL	*Sonchus oleraceus*
MEIN	*Melilotus indicus*
PHAU	*Pholistoma auritum*
VUME	*Vulpia megalura*
GAAP	*Galium aparine*
PTDR	*Pterostegia drymarioides*
CRER	*Tillaea erecta*
PAHE	*Parietaria hespera*
HECL	*Hemizonia clementina*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 10N

TRANSECT LOCATION: Near mouth of Graveyard Canyon.

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 60

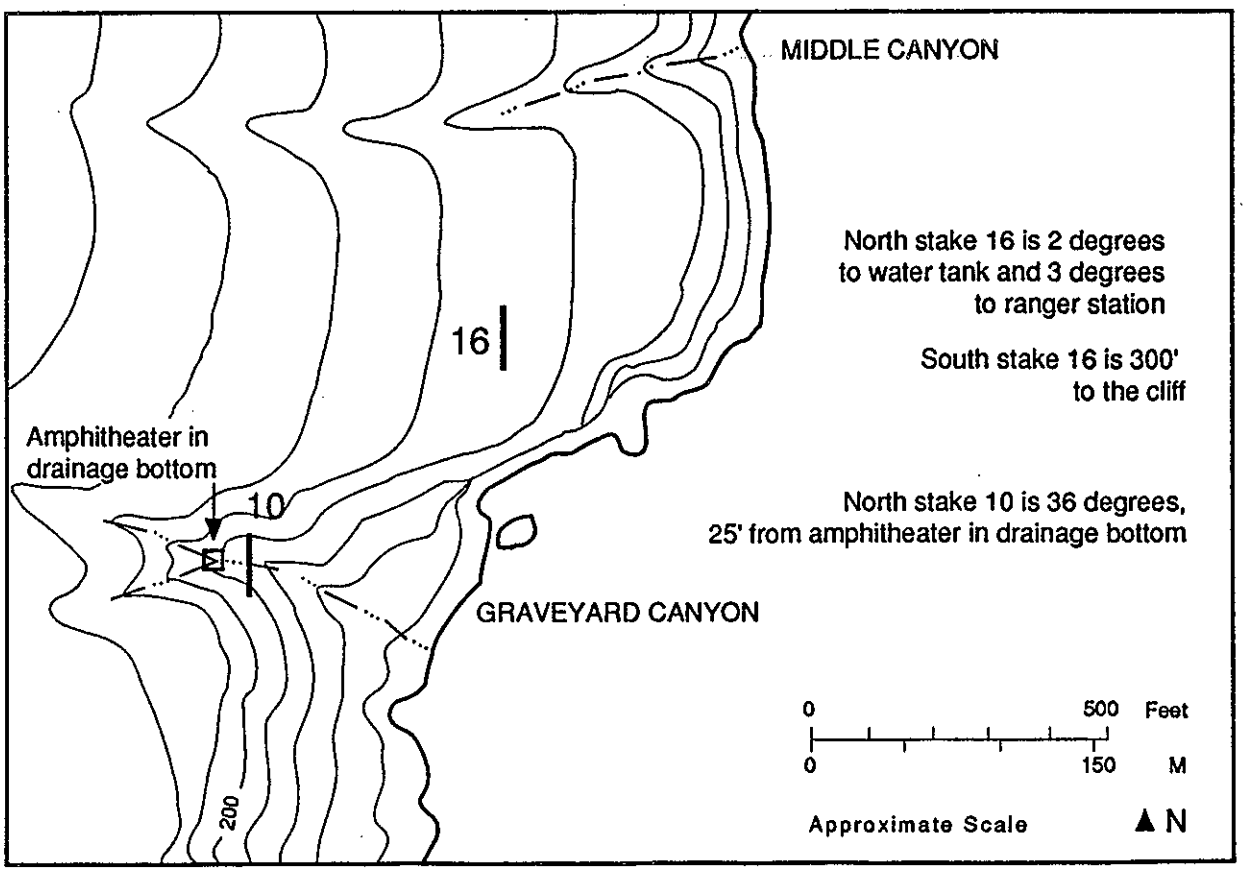
PLANT COMMUNITY: Maritime cactus scrub

ELEVATION: 160 ft.

SLOPE ASPECT: 170° SLOPE: 35°

SPECIES AND CODES:

MUMI	*Muhlenbergia microsperma*
MECR	*Mesembryanthemum crystallinum*
BRRU	*Bromus rubens*
CAMA	*Calystegia macrostegia*
ATSE	*Atriplex semibaccata*
OPLI	*Opuntia littoralis*
CHMU	*Chenopodium murale*
MAMA	*Marah macrocarpa*
MILA	*Mirabilis laevis*
ERCI	*Erodium cicutarium*
CRCL	*Cryptantha clevelandii*
AMPU	*Amblyopappus pusillus*
AMIN	*Amsinkia intermedia*
COGI	*Coreopsis gigantea*
PTDR	*Pterostegia drymarioides*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 10S

TRANSECT LOCATION: Near mouth of Graveyard Canyon.

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 70

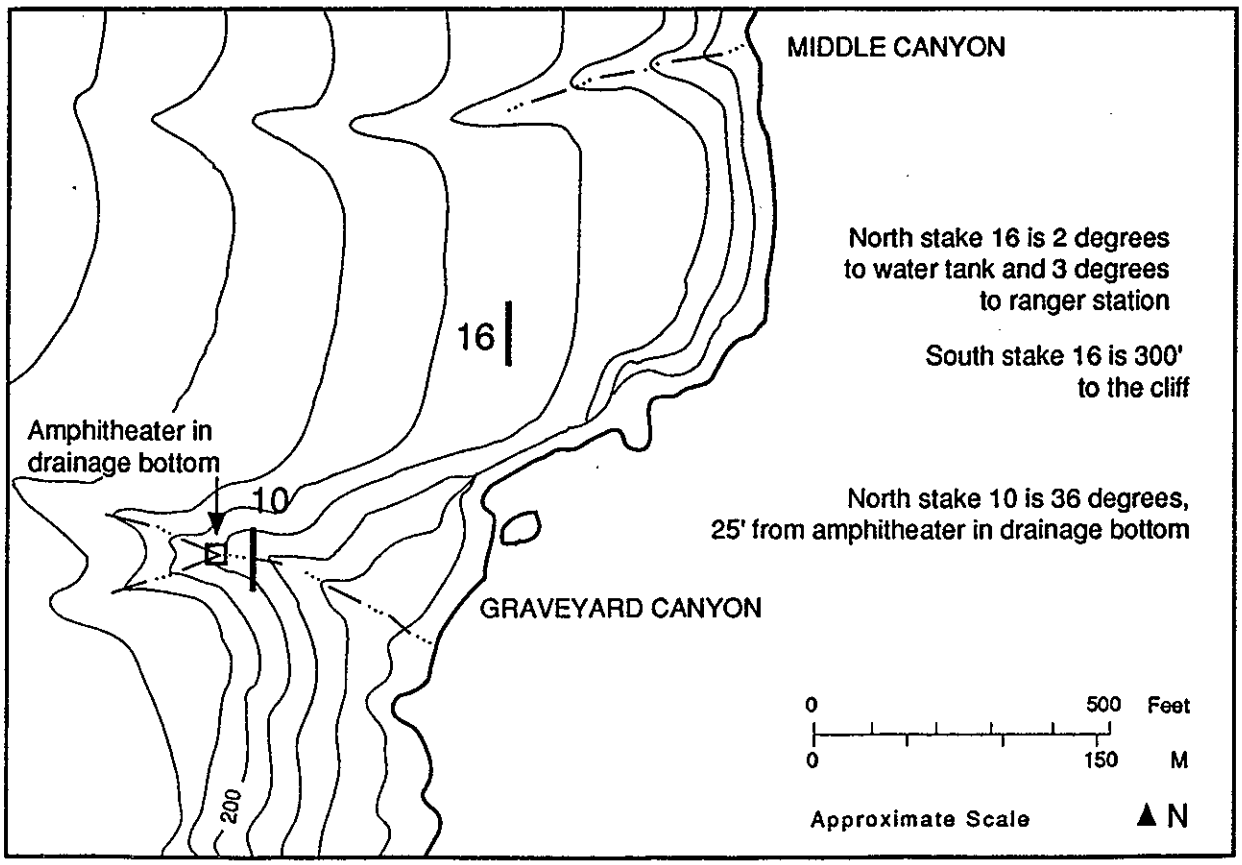
PLANT COMMUNITY: Sea cliff scrub

ELEVATION: 160 ft.

SLOPE ASPECT: 15° SLOPE: 35°

SPECIES AND CODES:

CRCL	*Cryptantha clevelandii*	PHRA	*Pholistoma racemosum*
BRRU	*Bromus rubens*	SIGA	*Silene gallica*
HECL	*Hemizonia clementina*	MILA	*Mirabilis laevis*
VUME	*Vulpia megalura*	GAAP	*Galium aparine*
PTDR	*Pterostegia drymarioides*	AMIN	*Amsinkia intermedia*
DIPU	*Dichelostemma pulchella*	ERCI	*Erodium cicutarium*
CLPE	*Claytonia perfoliata*	AVFA	*Avena fatua*
AMPU	*Amblyopappus pusillus*	MUMI	*Muhlenbergia microsperma*
CAMA	*Calystegia macrostegia*	ATSE	*Atriplex semibaccata*
COGI	*Coreopsis gigantea*	LACH	*Lasthenia chrysostoma*
ACMI	*Achillea millefolium*	MAPH	*Malacothrix philbrickii*
MAMA	*Marah macrocarpa*	TRTR	*Trifolium tridentatum*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 11

TRANSECT LOCATION: Northeast of North Peak, crossing the trail

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 130

PLANT COMMUNITY: *Coreopsis* scrub

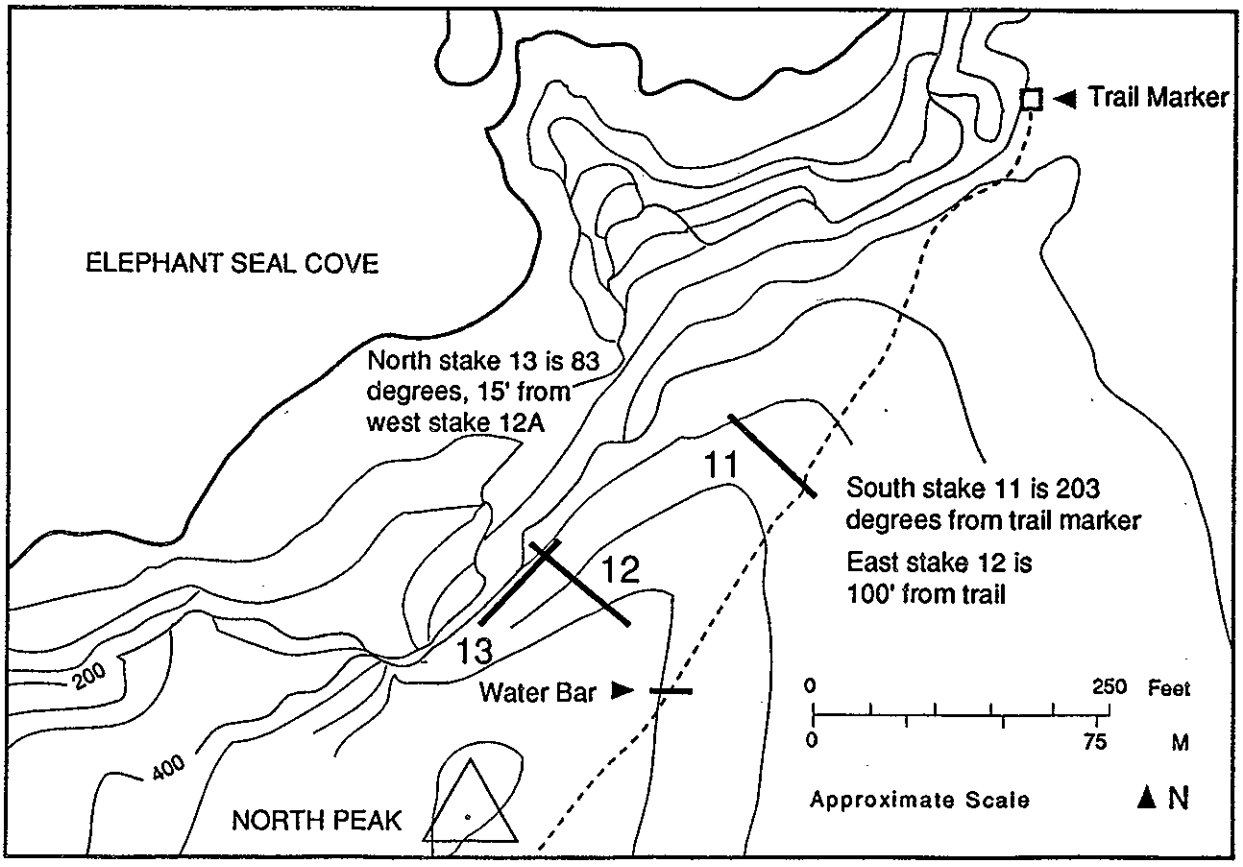
ELEVATION: ca. 400 ft.

SLOPE ASPECT: 38°

SLOPE: 21°

SPECIES AND CODES:

MECR	*Mesembryanthemum crystallinum*
HOGL	*Hordeum murinum* ssp. *glaucum*
COGI	*Coreopsis gigantea*
SUCA	*Suaeda californica*
ATCA	*Atriplex californica*
ATSE	*Atriplex semibaccata*
ACMI	*Achillea millefolium*
AMIN	*Amsinkia intermedia*
MAPH	*Malacothrix philbrickii*
CRCL	*Cryptantha clevelandii*
CLPE	*Claytonia perfoliata*
PTDR	*Pterostegia drymarioides*
BRRU	*Bromus rubens*
CHMU	*Chenopodium murale*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 12

TRANSECT LOCATION: North of North Peak

TRANSECT SAMPLE DIRECTION: W-E

NUMBER OF POINTS: 130

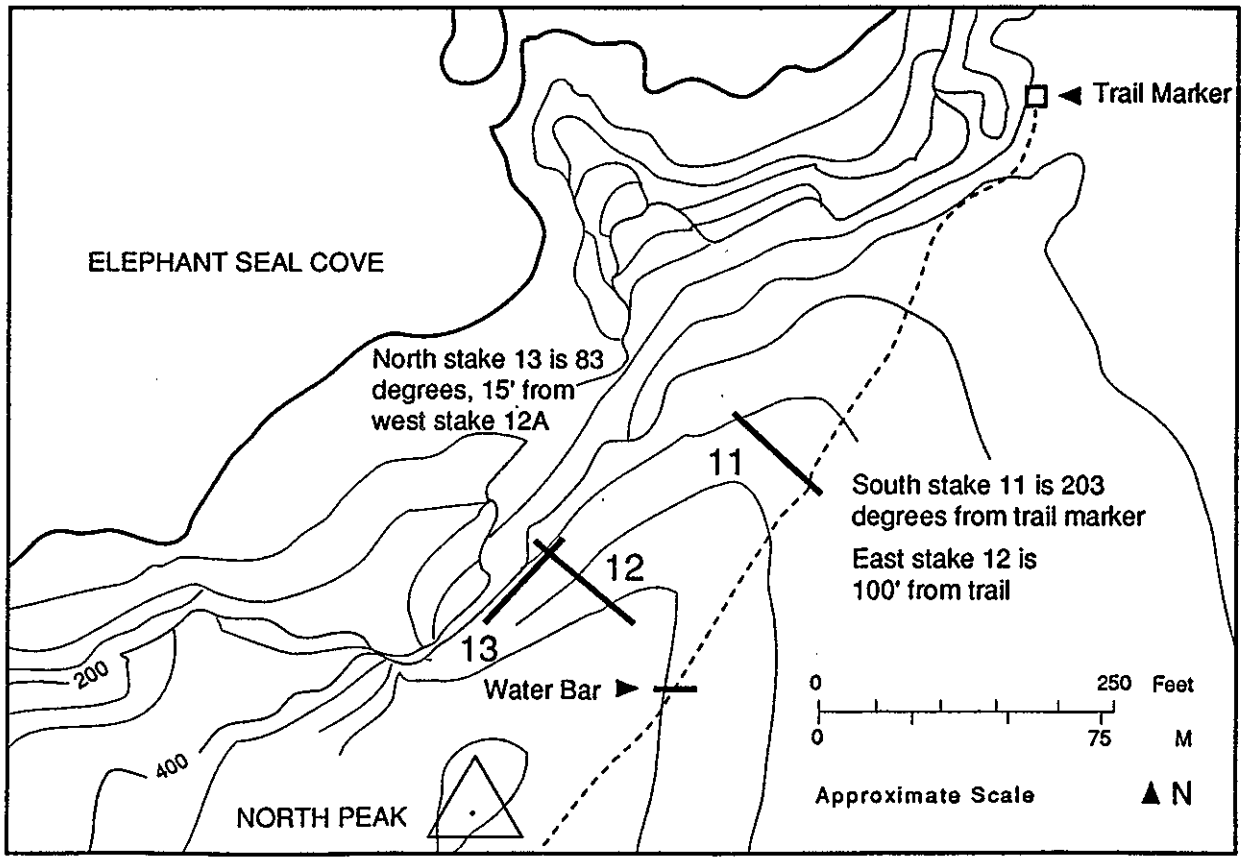
PLANT COMMUNITY: *Coreopsis* scrub

ELEVATION: 520 ft.

SLOPE ASPECT: 106° SLOPE: 16°

SPECIES AND CODES:

HOGL	*Hordeum murinum* ssp. *glaucum*
COGI	*Coreopsis gigantea*
BRRU	*Bromus rubens*
MECR	*Mesembryanthemum crystallinum*
AVFA	*Avena fatua*
HECL	*Hemizonia clementina*
ATSE	*Atriplex semibaccata*
CHMU	*Chenopodium murale*
SUCA	*Suaeda californica*
AMIN	*Amsinkia intermedia*
CLPE	*Claytonia perfoliata*
PTDR	*Pterostegia drymarioides*
MAPA	*Malva parviflora*
ERGR	*Eriogonum grande*
ASTR	*Atragulus traskiae*
MAPH	*Malacothrix philbrickii*
BRAR	*Bromus arizonicus*
ERCI	*Erodium cicutarium*
ACMI	*Achillea millefolium*
ERMO	*Erodium moschatum*
VUME	*Vulpia megalura*
SCAN	*Scleranthus annuus*
VUMY	*Vulpia myuros*
MENO	*Mesembryanthemum nodiflorum*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 13

TRANSECT LOCATION: North of North Peak.

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

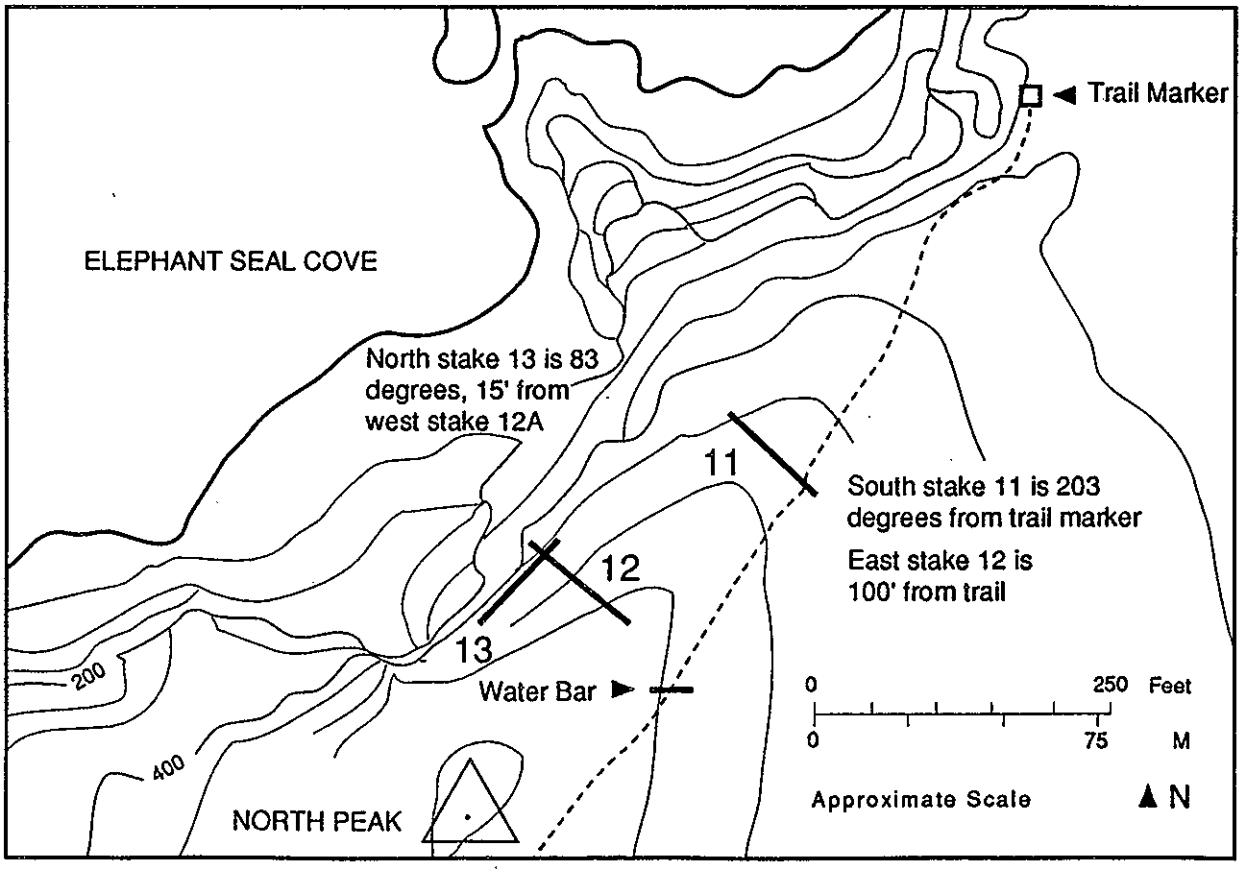
PLANT COMMUNITY: Sea cliff scrub

ELEVATION: 520 ft.

SLOPE ASPECT: 286° SLOPE: 30°

SPECIES AND CODES:

HECL	*Hemizonia clementina*
BRRU	*Bromus rubens*
CLPE	*Claytonia perfoliata*
PTDR	*Pterostegia drymarioides*
CRCL	*Cryptantha clevelandii*
AMIN	*Amsinkia intermedia*
VUME	*Vulpia megalura*
ERGI	*Eriogonum giganteum*
BRTR	*Bromus trinii*
MAPH	*Malacothrix philbrickii*
CHMU	*Chenopodium murale*
ERCI	*Erodium cicutarium*
CRER	*Tillaea erecta*
VUDE	*Vulpia dertonensis*
HOGL	*Hordeum murinum* ssp. *glaucum*
TRTR	*Trifolium tridentatum*
VUMY	*Vulpia myuros*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 14

TRANSECT LOCATION: Cat Canyon, on south facing slope, below the trail

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

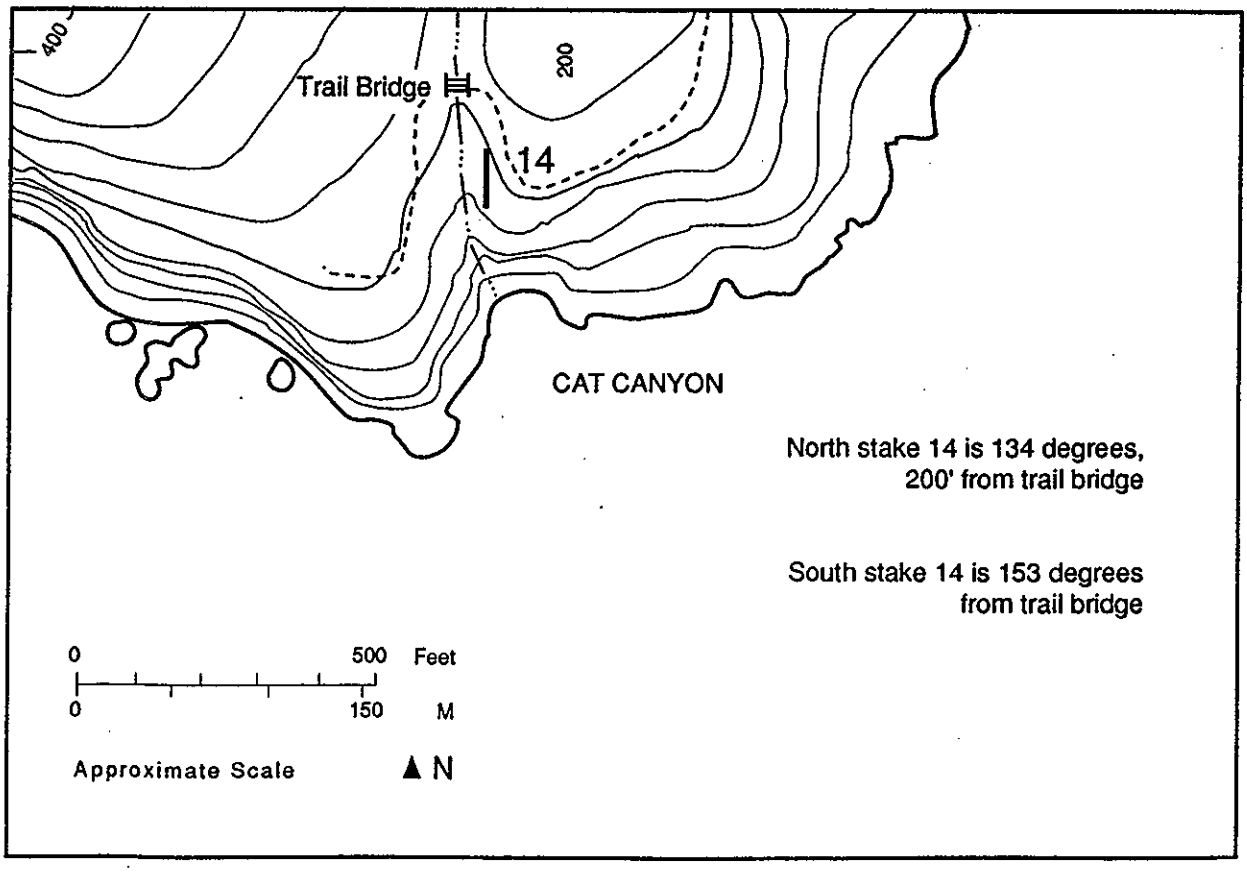
PLANT COMMUNITY: Maritime cactus scrub

ELEVATION: 200 ft.

SLOPE ASPECT: 265° SLOPE: 20°

SPECIES AND CODES:

BRRU	*Bromus rubens*	ERCI	*Erodium cicutarium*
OPPR	*Opuntia prolifera*	HOGL	*Hordeum murinum* ssp. *glaucum*
MECR	*Mesembryanthemum crystallinum*	AMPU	*Amblyopappus pusillus*
AMIN	*Amsinkia intermedia*	CRER	*Tillaea erecta*
CAMA	*Calystegia macrostegia*	VUME	*Vulpia megalura*
MAPH	*Malacothrix philbrickii*	SOOL	*Sonchus oleraceus*
CHMU	*Chenopodium murale*	PEEM	*Perityle emoryi*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 15

TRANSECT LOCATION: Between Cave Canyon and Middle Canyon

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

PLANT COMMUNITY: Boxthron scrub/*Coreopsis* scrub

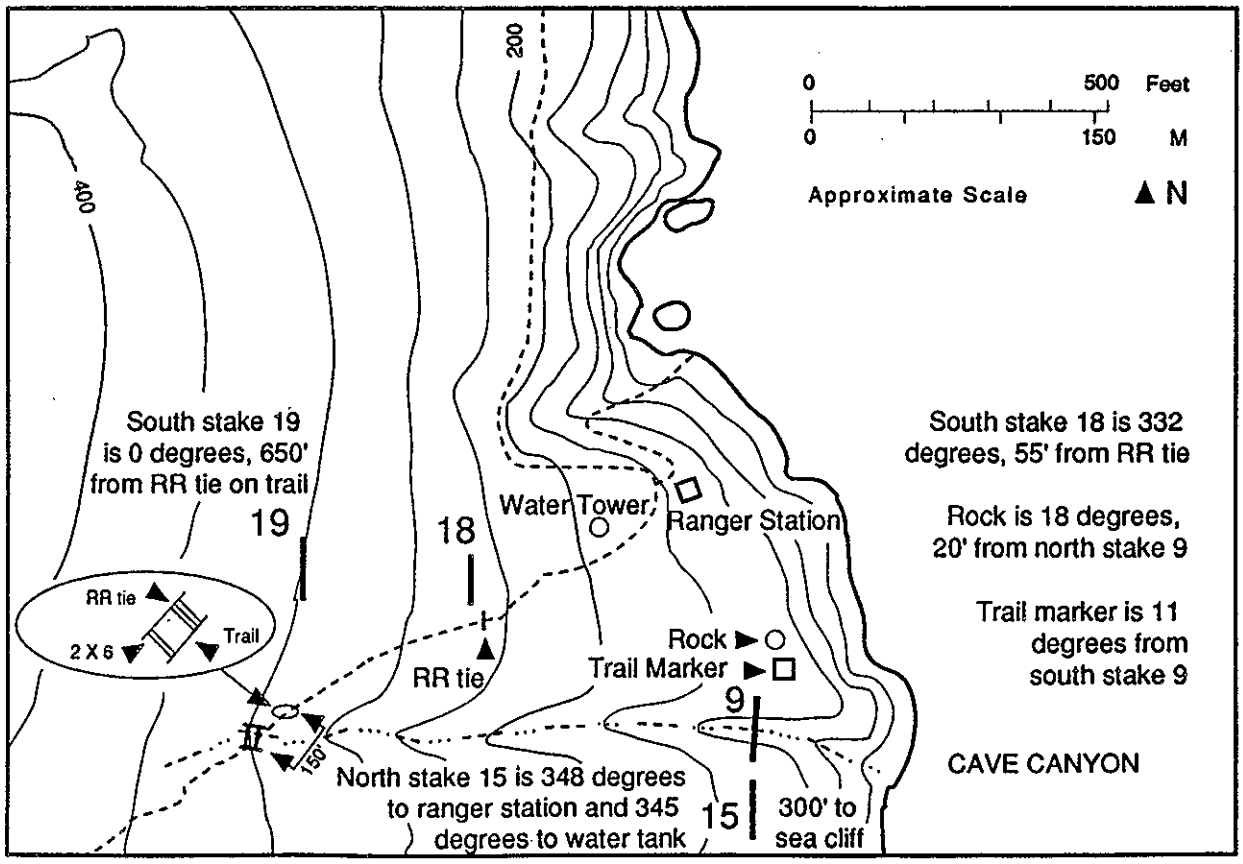
ELEVATION: 120 ft.

SLOPE ASPECT: 85°

SLOPE: 5°

SPECIES AND CODES:

AVFA	*Avena fatua*
BRRU	*Bromus rubens*
LYCA	*Lycium californicum*
ATSE	*Atriplex semibaccata*
ERMO	*Erodium moschatum*
GAAP	*Galium aparine*
AMIN	*Amsinkia intermedia*
CLPE	*Claytonia perfoliata*
DIPU	*Dichelostemma pulchella*
MAPA	*Malva parviflora*
AMPU	*Amblyopappus pusillus*
SOOL	*Sonchus oleraceus*
COGI	*Coreopsis gigantea*
BRMO	*Bromus mollis*
ACMI	*Achillea millefolium*
MECR	*Mesembryanthemum crystallinum*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 16

TRANSECT LOCATION: South of Middle Canyon

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

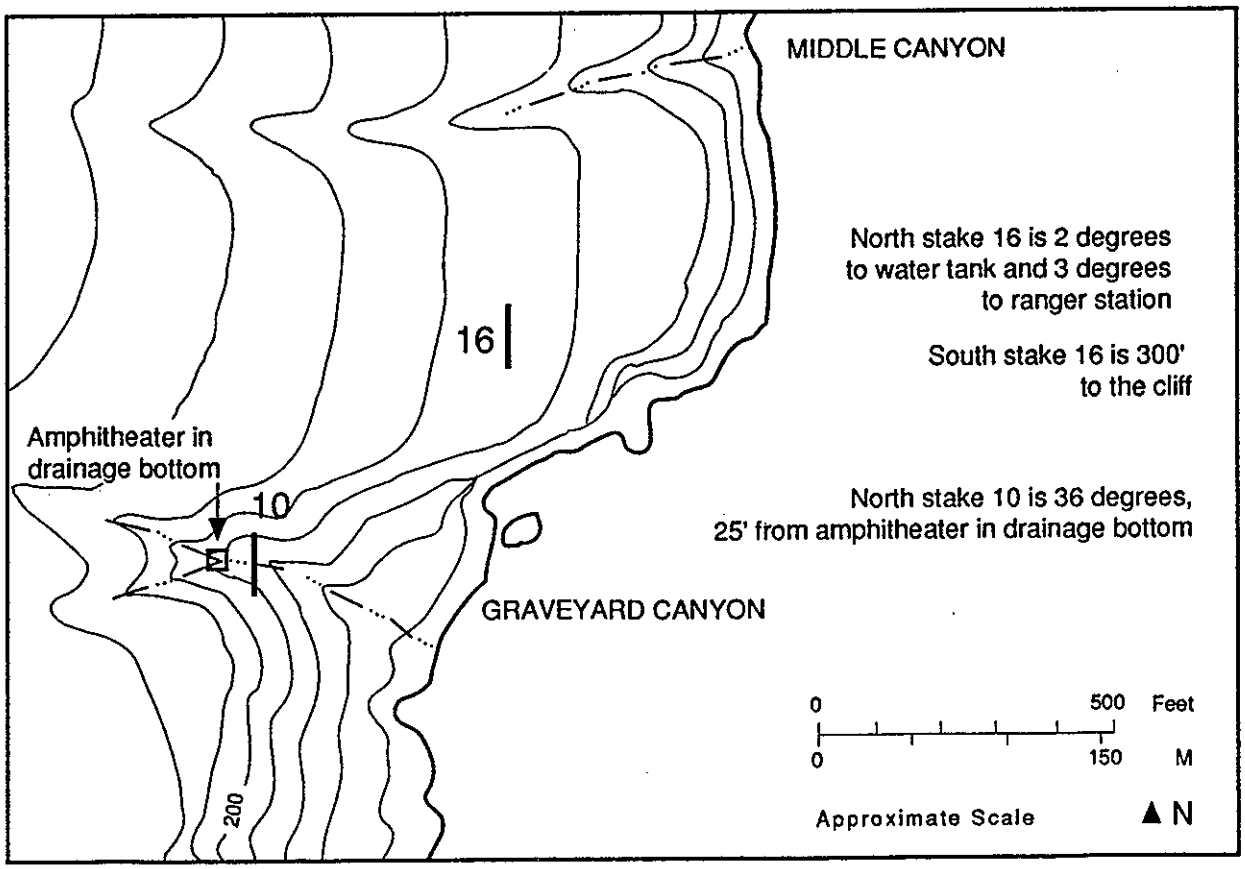
PLANT COMMUNITY: Boxthorn scrub/*Coreopsis* scrub

ELEVATION: 160 ft.

SLOPE ASPECT: 80° SLOPE: 5°

SPECIES AND CODES:

BRRU	*Bromus rubens*
ERMO	*Erodium moschatum*
LYCA	*Lycium californicum*
ATSE	*Atriplex semibaccata*
AVFA	*Avena fatua*
AMIN	*Amsinkia intermedia*
MAPA	*Malacothrix parviflora*
GAAP	*Galium aparine*
DIPU	*Dichelostemma pulchella*
SOOL	*Sonchus oleraceus*
AMPU	*Amblyopappus pusillus*
BRMO	*Bromus mollis*
COGI	*Coreopsis gigantea*
TRTR	*Trifolium tridentatum*
CLPE	*Claytonia perfoliata*
ACMI	*Achillea millefolium*
HOGL	*Hordeum murinum* ssp. *glaucum*
MECR	*Mesembryanthemum crystallinum*
PTDR	*Pterostegia drymarioides*
LAAU	*Lamarkia aurea*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 17

TRANSECT LOCATION: East slope of Signal Peak

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

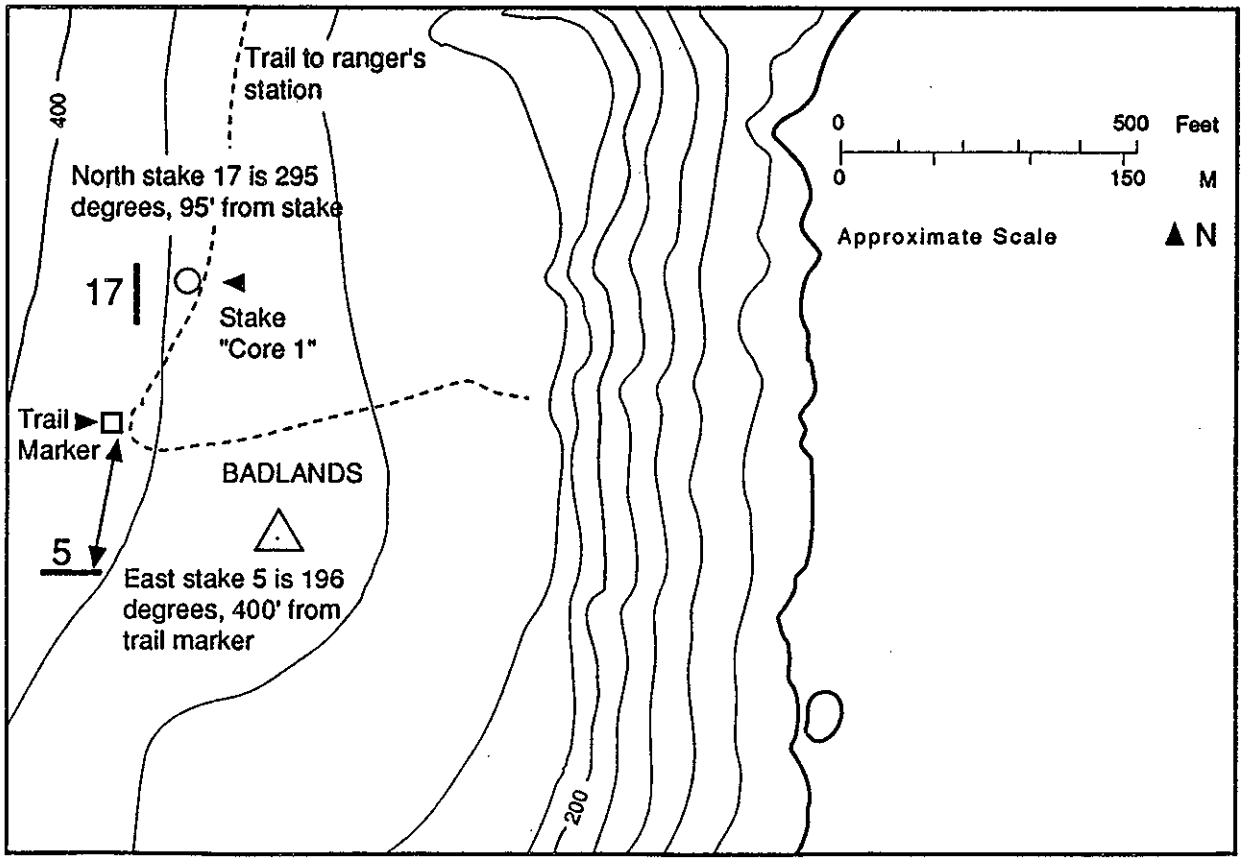
PLANT COMMUNITY: *Coreopsis* scrub

ELEVATION: 360 ft.

SLOPE ASPECT: 73° SLOPE: 6°

SPECIES AND CODES:

ATSE	*Atriplex semibaccata*
BRRU	*Bromus rubens*
COGI	*Coreopsis gigantea*
AVFA	*Avena fatua*
BRMO	*Bromus mollis*
ERMO	*Erodium moschatum*
AMIN	*Amsinkia intermedia*
MAPA	*Malva parviflora*
SOOL	*Sonchus oleraceus*
DIPU	*Dichelostemma pulchella*
LAAU	*Lamarkia aurea*
HOGL	*Hordeum murinum* ssp. *glaucum*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 18

TRANSECT LOCATION: Immediately west of campground

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

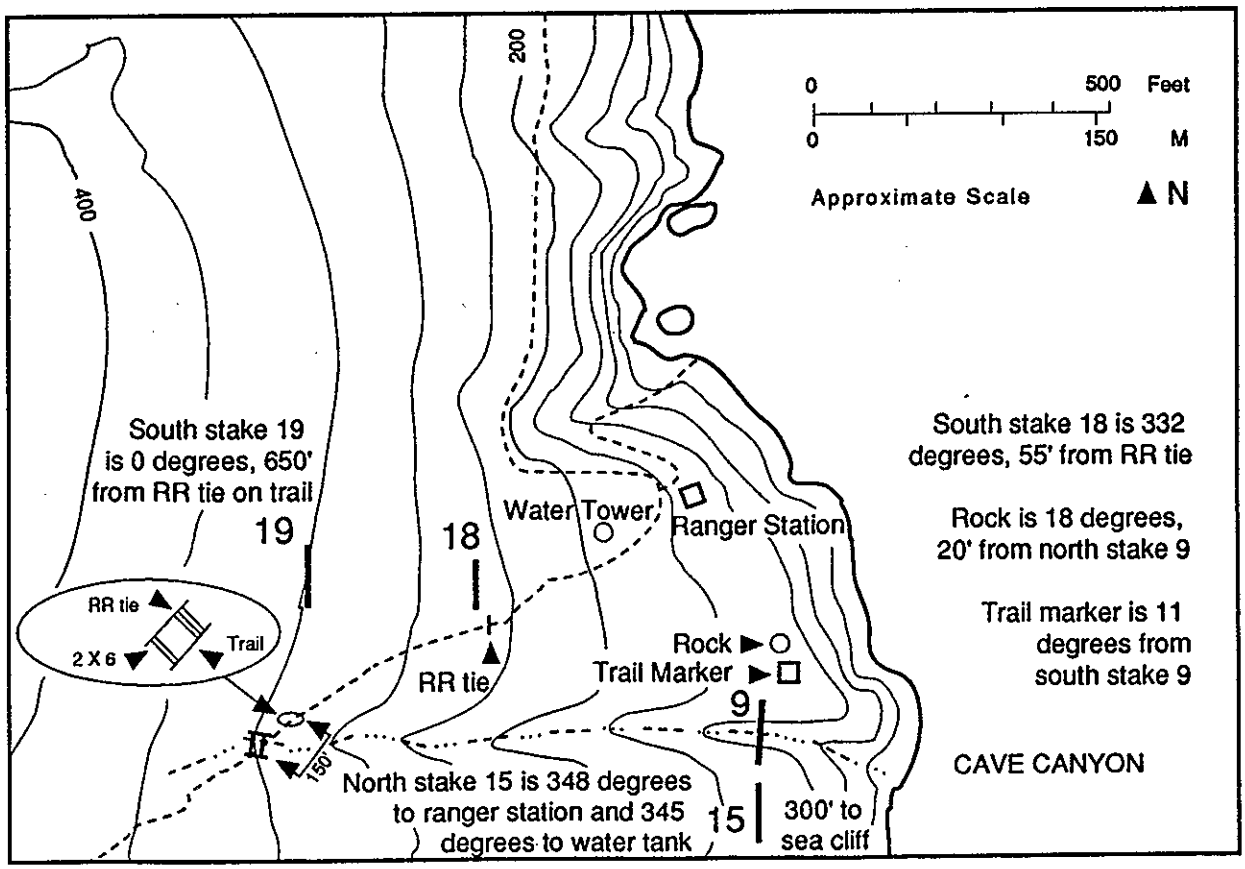
PLANT COMMUNITY: Grassland

ELEVATION: 275 ft.

SLOPE ASPECT: 60° SLOPE: 8°

SPECIES AND CODES:

AVFA	*Avena fatua*	BRAR	*Bromus arizonicus*
BRMO	*Bromus mollis*	HOGL	*Hordeum murinum* ssp. *glaucum*
AMIN	*Amsinkia intermedia*	ERMO	*Erodium moschatum*
BRRU	*Bromus rubens*	MAPA	*Malva parviflora*
SOOL	*Sonchus oleraceus*	GAAP	*Galium aparine*
ATSE	*Atriplex semibaccata*	DIPU	*Dichelostemma pulchella*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SANTA BARBARA ISLAND 19

TRANSECT LOCATION: On the plateau below North Peak

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

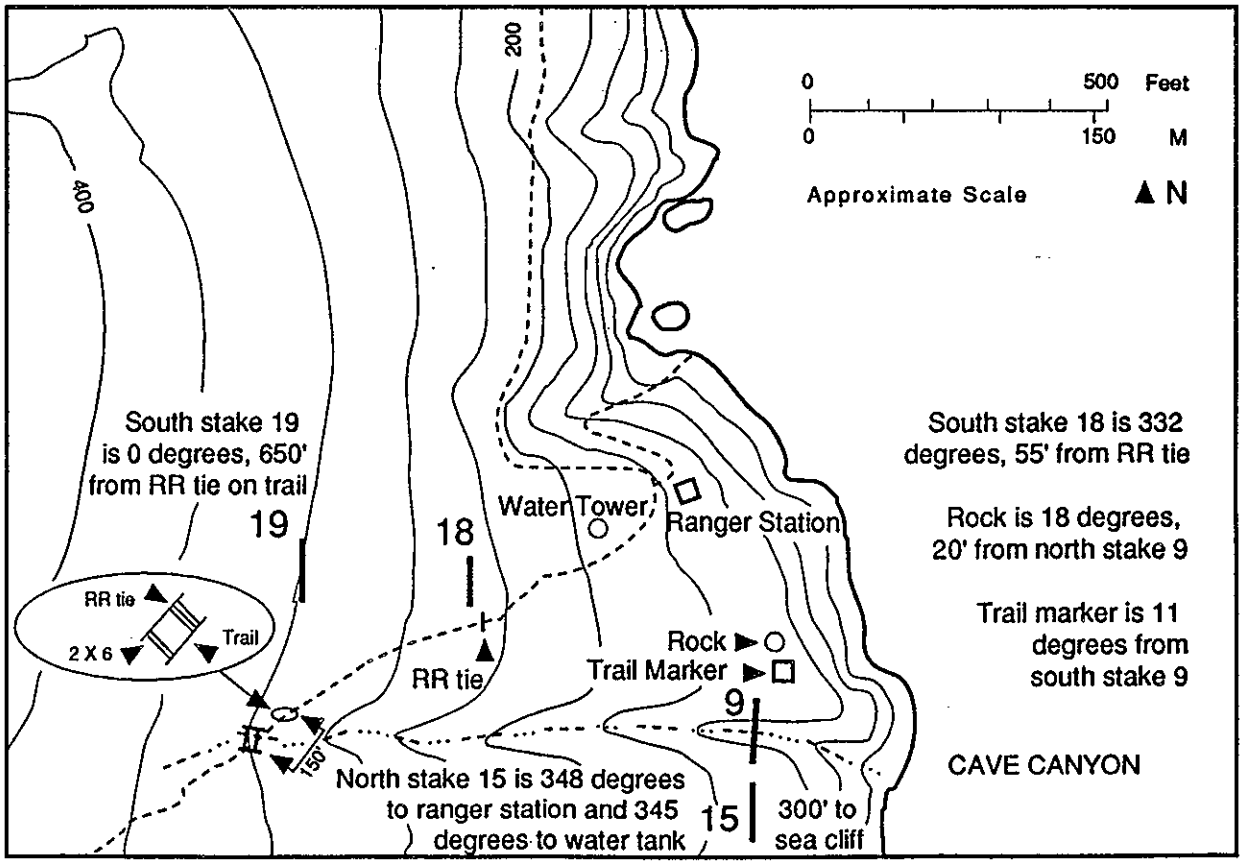
PLANT COMMUNITY: Grassland

ELEVATION: 360 ft.

SLOPE ASPECT: 90° SLOPE: 4°

SPECIES AND CODES:

AVFA	*Avena fatua*	HECL	*Hemizonia clementina*
BRRU	*Bromus rubens*	HOGL	*Hordeum glaucum*
BRMO	*Bromus mollis*	MEPO	*Medicago polymorpha*
ERMO	*Erodium moschatum*	COGI	*Coreopsis gigantea*
SOOL	*Sonchus oleraceus*	BRAR	*Bromus arizonicus*
ATSE	*Atriplex semibaccata*	MAPA	*Malva parviflora*
AMIN	*Amsinkia intermedia*	PTDR	*Pterostegia drymarioides*



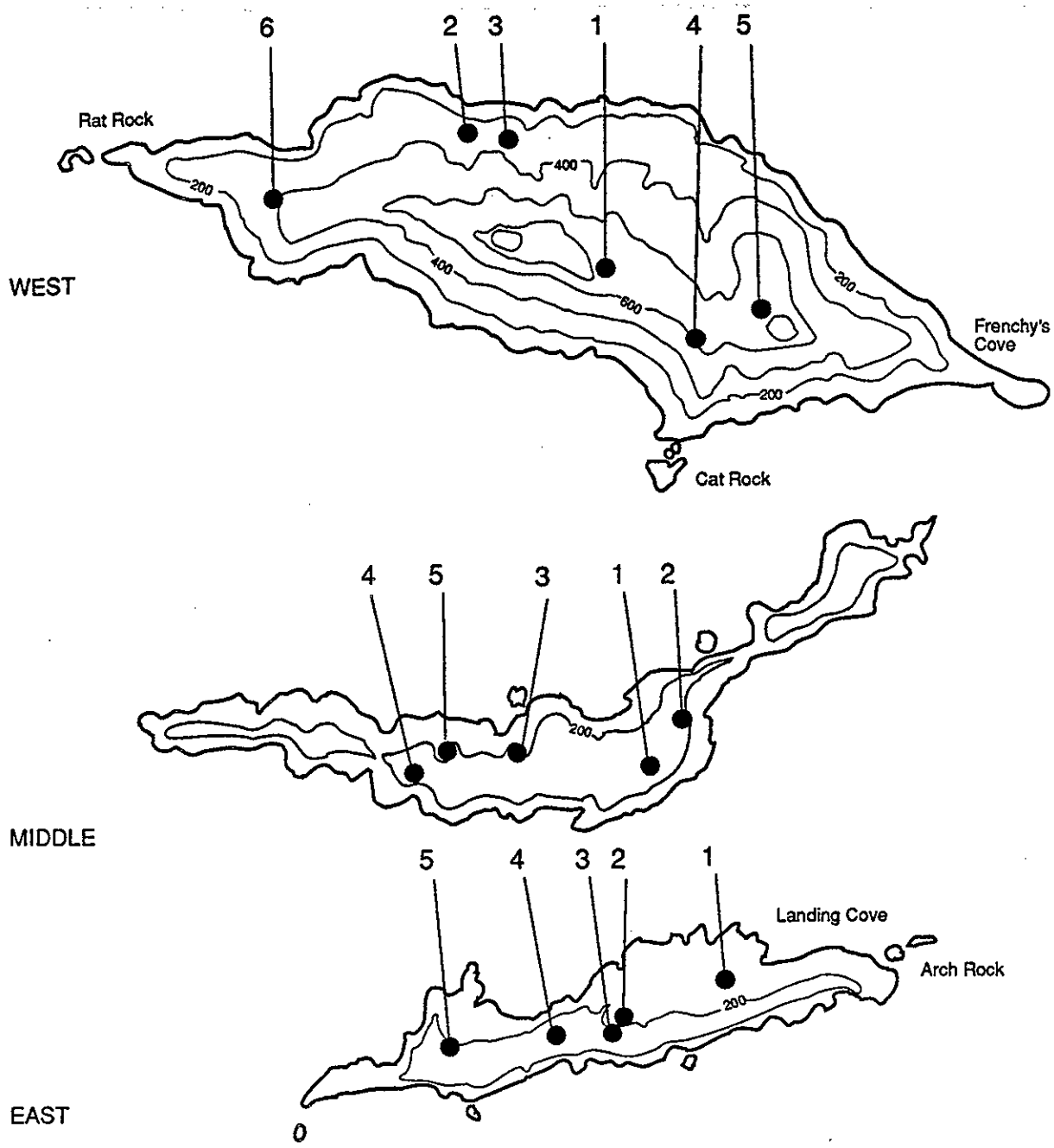


Figure A - 2. ANACAPA ISLAND

Vegetation
Transect Locations

VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

EAST ANACAPA ISLAND 01

TRANSECT LOCATION: West of Visitor Center in *Dudleya* grassland.

TRANSECT SAMPLE DIRECTION: W-E

NUMBER OF POINTS: 100

PLANT COMMUNITY: Perennial Iceplant

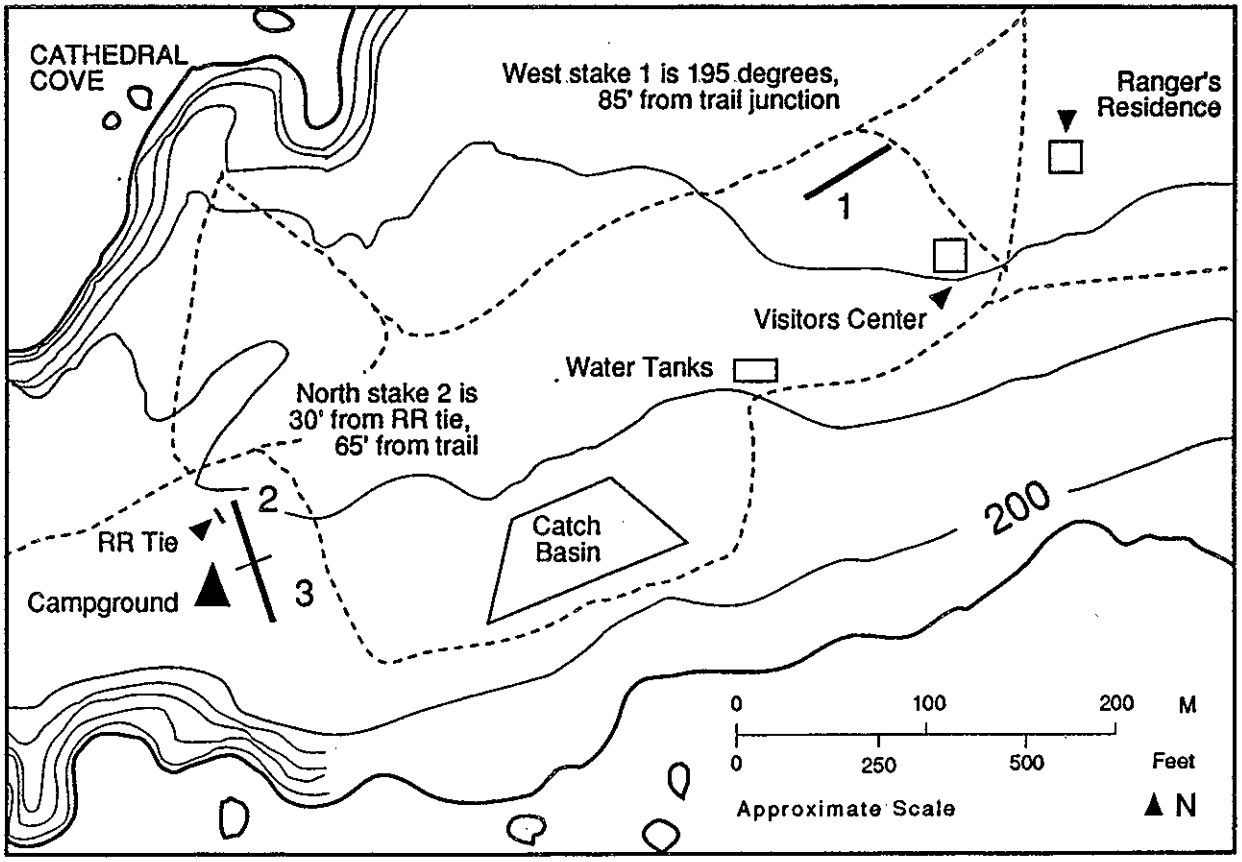
ELEVATION: 180 ft.

SLOPE ASPECT: 5°

SLOPE: 5°

SPECIES AND CODES:

MAPH	*Malaphora crocea*	SPMA	*Spergularia macrotheca*
HOGL	*Hordeum murinum* ssp. *glaucum*	DIPU	*Dichelostemma pulchella*
GRLA	*Grindelia latifolia*	CHMU	*Chenopodium murale*
HECL	*Hemizonia clementina*	ANAR	*Anagalis arvensis*
ATSE	*Atriplex semibaccata*	AVBA	*Avena barbata*
BRDI	*Bromus diandrus*	ERMO	*Erodium moschatum*
BRMO	*Bromus mollis*	MEPO	*Medicago polymorpha*
COGI	*Coreopsis gigantea*	CLPE	*Claytonia perfoliata*
ACMI	*Achillaea millefolium*	HOCA	*Hordeum californicum*
FRGR	*Frankenia grandifolia*	PTDR	*Pterostegia drymarioides*
SOOL	*Sonchus oleraceus*	SIGA	*Silene gallica*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

EAST ANACAPA ISLAND 02

TRANSECT LOCATION: 30' east of Campground

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

PLANT COMMUNITY: Grassland

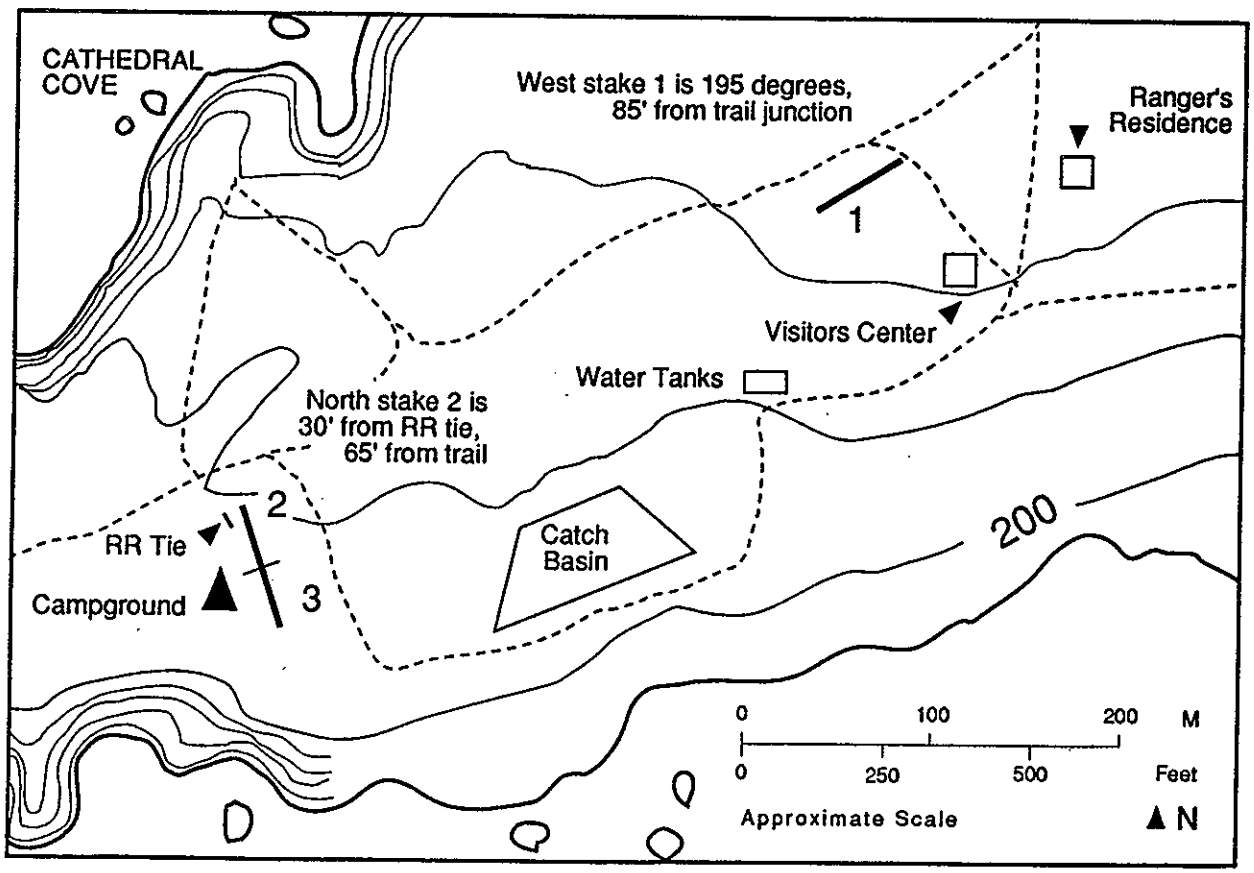
ELEVATION: 200 ft.

SLOPE ASPECT: 300°

SLOPE: S1/2 = 20°
N1/2 = 2°

SPECIES AND CODES:

HECL	*Hemizonia clementina*
HOGL	*Hordeum murinum* ssp. *glaucum*
STPU	*Stipa pulchra*
AVBA	*Avena barbata*
BRMO	*Bromus mollis*
ATSE	*Atriplex semibaccata*
DUCA	*Dudleya caespitosa*
MAPA	*Malva parviflora*
DIPU	*Dichelostemma pulchella*
BRRU	*Bromus rubens*
VUDE	*Vulpia dertonensis*
SOOL	*Sonchus oleraceus*
ERMO	*Erodium moschatum*
TRTR	*Trifolium tridentatum*
STLE	*Stipa lepida*
BRDI	*Bromus diandrus*
POAC	*Poa scabrella*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

EAST ANACAPA ISLAND 03

TRANSECT LOCATION: East of Campground, extending south from EAI 02.

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

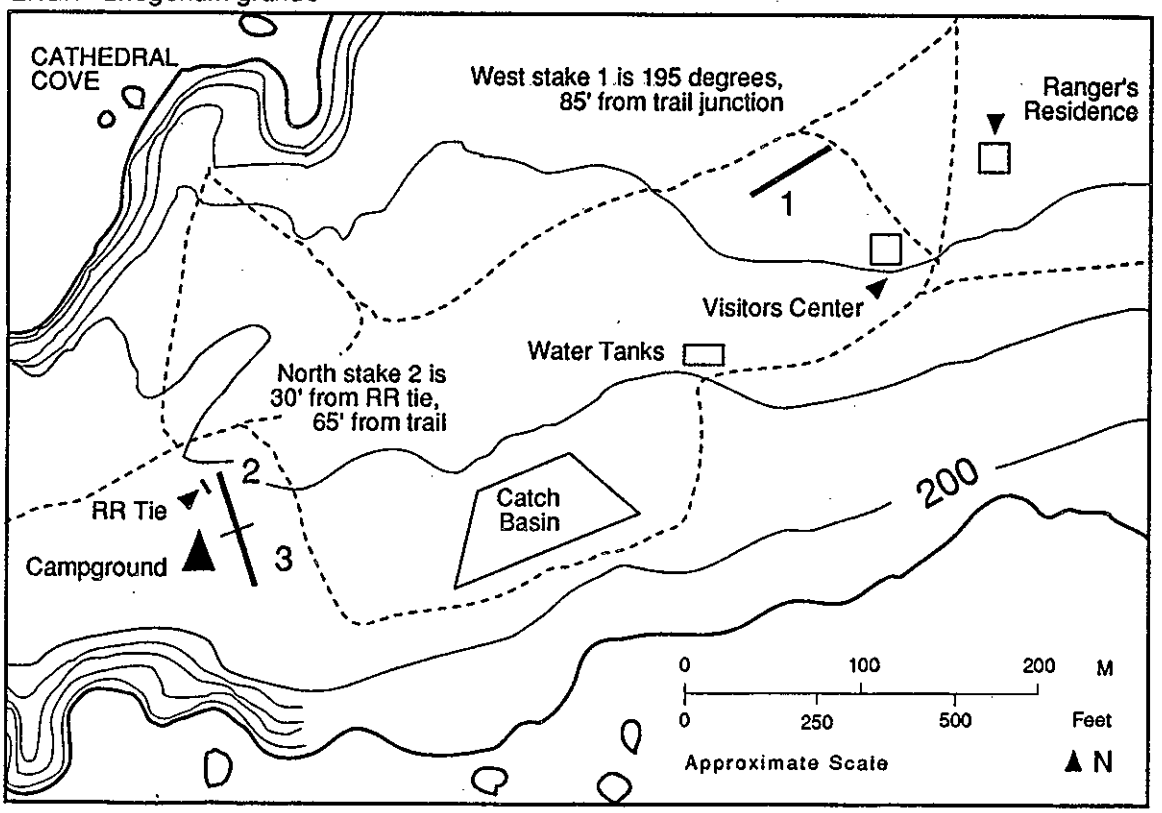
PLANT COMMUNITY: *Coreopsis* scrub

ELEVATION: 200 ft.

SLOPE ASPECT: 0° SLOPE: 0°

SPECIES AND CODES:

AVBA	*Avena barbata*
STPU	*Stipa pulchra*
HECL	*Hemizonia clementina*
COGI	*Coreopsis gigantea*
BRMO	*Bromus mollis*
BRRU	*Bromus rubens*
SOOL	*Sonchus oleraceus*
VUDE	*Vulpia dertonensis*
ACMI	*Achillea millefolium*
CAMA	*Calystegia macrostegia*
LODE	*Lotus dendroideus*
SILA	*Silene laciniata*
TRTR	*Trifolium tridentatum*
PTDR	*Pterostegia drymarioides*
ERGR	*Eriogonum grande*
GRLA	*Grindelia latifolia*
ZIFR	*Zigadenas fremontii*
MEIM	*Melica imperfecta*
SAAR	*Sanicula arguta*
DOCL	*Dodecatheon clevlandii*
CLPE	*Claytonia perfoliata*
GAAP	*Galium aparine*
MAMA	*Marah macrocarpa*
DIPU	*Dichelostemma pulchella*
VUMY	*Vulpia myuros*
ALPR	*Allium praecox*
POSC	*Poa scabrella*
DEPA	*Delphynium parryi*
BRTR	*Bromus trinii*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

EAST ANACAPA ISLAND 04

TRANSECT LOCATION: Midway along trail between Campground and west loop of Nature Trail.

TRANSECT SAMPLE DIRECTION: W-E

NUMBER OF POINTS: 100

PLANT COMMUNITY: Grassland

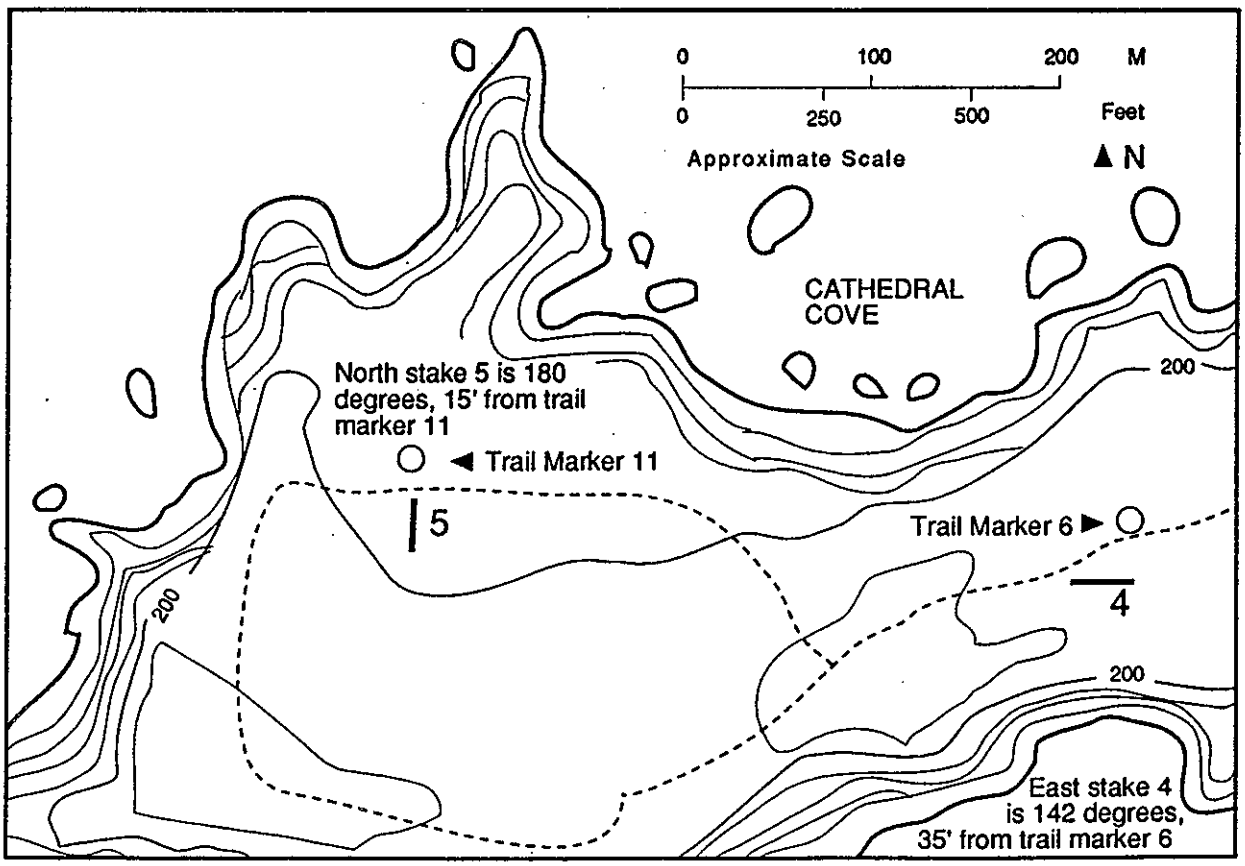
ELEVATION: 200 ft.

SLOPE ASPECT: 5°

SLOPE: 5°

SPECIES AND CODES:

HECL	*Hemizonia clementina*
DUCA	*Dudleya caespitosa*
STPU	*Stipa pulchra*
GRLA	*Grindelia latifolia*
ATSE	*Atriplex semibaccata*
FRGR	*Frankenia grandifolia*
MACR	*Malaphora crocea*
CAMA	*Calystegia macrostegia*
BRRU	*Bromus rubens*
SOOL	*Sonchus oleraceus*
ERCI	*Erodium cicutarium*
TRTR	*Trifolium tridentatum*
COGI	*Coreopsis gigantea*
HOCA	*Hordeum californicum*
SPMA	*Spergularia macrotheca*
CRER	*Tillaea erecta*
BRMO	*Bromus mollis*
DISP	*Distichlis spicata*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

EAST ANACAPA ISLAND 05

TRANSECT LOCATION: West end of Island, just across trail from marker #11.

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

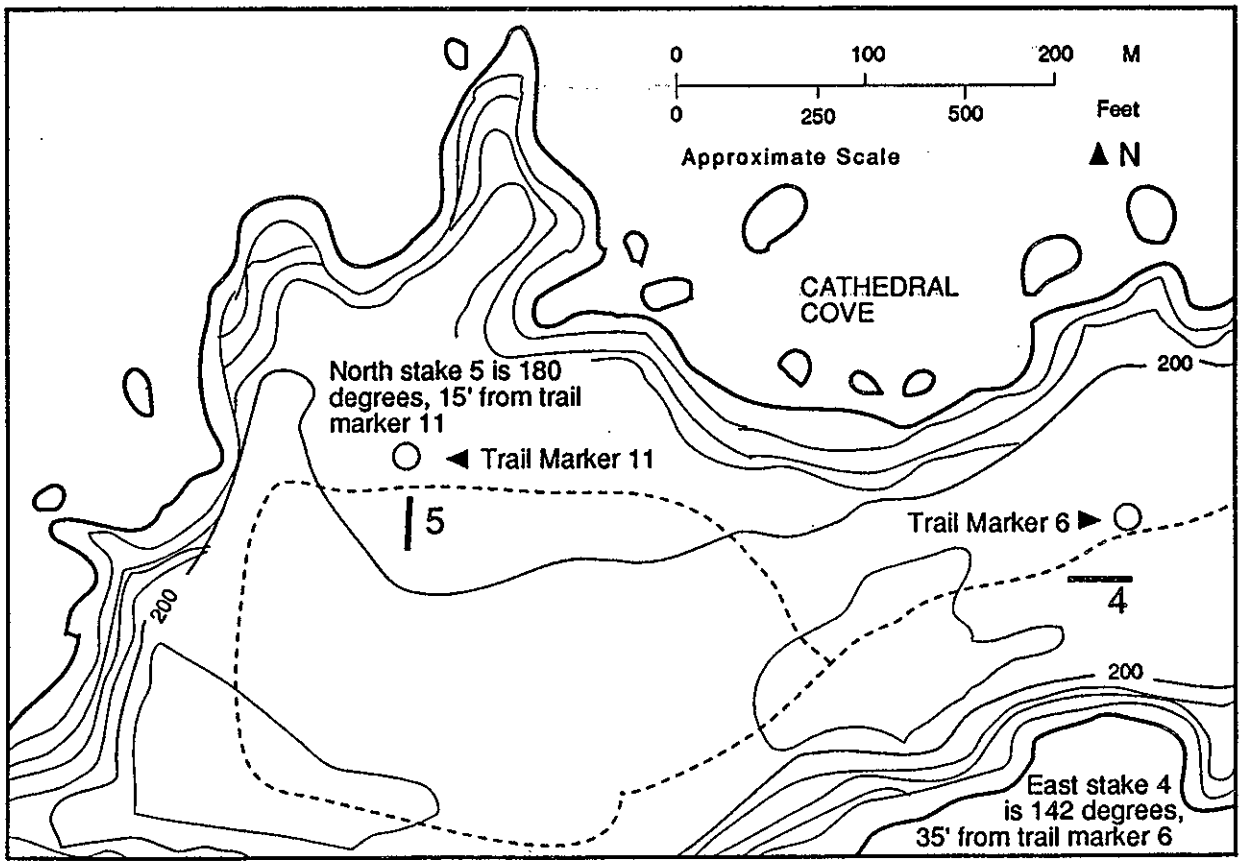
PLANT COMMUNITY: Perennial Iceplant

ELEVATION: 200 ft.

SLOPE ASPECT: 0° SLOPE: 0°

SPECIES AND CODES:

DISP	*Distichlis spicata*
GRLA	*Grindelia latifolia*
MACR	*Malaphora crocea*
DUCA	*Dudleya caespitosa*
SOOL	*Sonchus oleraceus*
ATCA	*Atriplex californica*
HOCA	*Hordeum californicum*
LODE	*Lotus dendroideus*
SPMA	*Spergularia macrotheca*
COGI	*Coreopsis gigantea*
BRRU	*Bromus rubens*
CLPE	*Claytonia perfoliata*
FRGR	*Frankenia grandifolia*
PTDR	*Pterostegia drymarioides*
TRTR	*Trifolium tridentatum*
HOGL	*Hordeum murinum* ssp. *glaucum*
ATSE	*Atriplex semibaccata*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

MIDDLE ANACAPA ISLAND 01

TRANSECT LOCATION: Bench below and east of High Point.

TRANSECT SAMPLE DIRECTION: W-E

NUMBER OF POINTS: 100

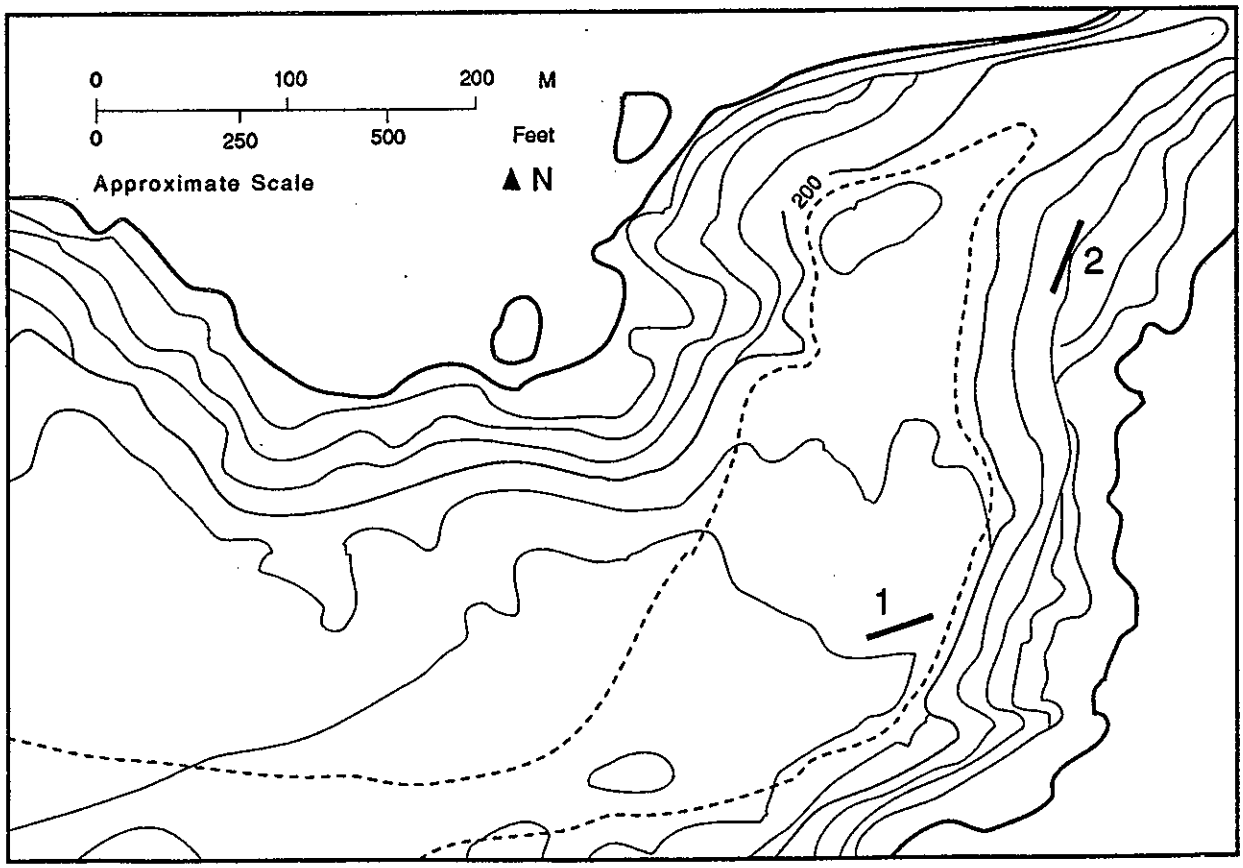
PLANT COMMUNITY: Grassland

ELEVATION: 220 ft.

SLOPE ASPECT: 320° SLOPE: 1°

SPECIES AND CODES:

STPU	*Stipa pulchra*
DUCA	*Dudleya caespitosa*
AVBA	*Avena barbata*
VUDE	*Vulpia dertonensis*
BRRU	*Bromus rubens*
ERAR	*Eriogonum arborescens*
LODE	*Lotus dendroideus*
GRLA	*Grindelia latifolia*
HAVE	*Haplopappus venetus*
HECL	*Hemizonia clementina*
BRMO	*Bromus mollis*
COGI	*Coreopsis gigantea*
BRDI	*Bromus diandrus*
GAAP	*Galium aparine*
SIGA	*Siline gallica*
VUMY	*Vulpia myuros*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

MIDDLE ANACAPA ISLAND 02

TRANSECT LOCATION: East end of island, on south facing sea slope.

TRANSECT SAMPLE DIRECTION: SW-NE

NUMBER OF POINTS: 100

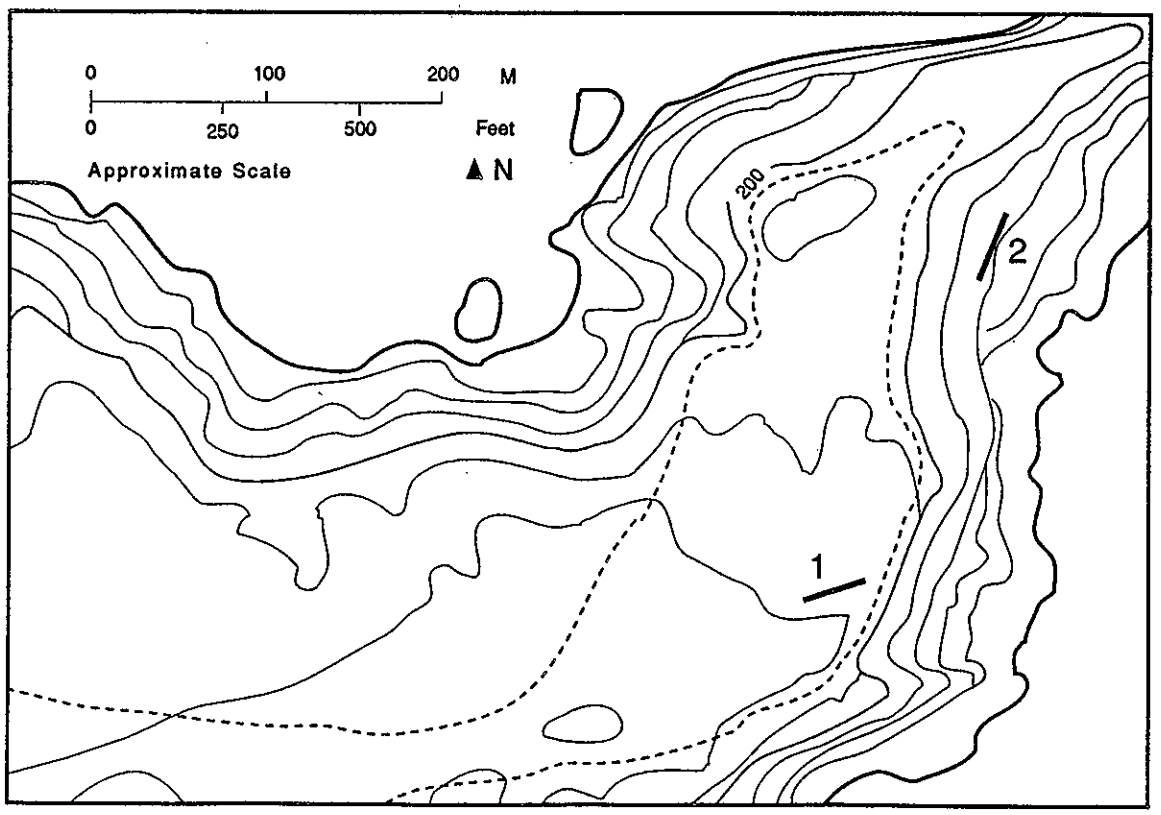
PLANT COMMUNITY: Coastal Sage Srub

ELEVATION: 120 ft.

SLOPE ASPECT: 128° SLOPE: 34°

SPECIES AND CODES:

ARCA	*Artemisia*
BRRU	*Bromus rubens*
ENCA	*Encelia californica*
STPU	*Stipa pulchra*
HAVE	*Haplopappus venetus*
ERGR	*Eriogonum grande*
MILA	*Mirabilis laevis*
DUCA	*Dudleya caespitosa*
OPPR	*Opuntia prolifera*
SOOL	*Sonchus oleraceus*
CAMA	*Calystegia macrostgia*
BRMO	*Bromus mollis*
HOGL	*Hordeum murnum* ssp. *glaucum*
AVBA	*Avena barbata*
DAPU	*Daucus pusillus*
GNMI	*Gnaphalium microcephalum*
GAAP	*Galium aparine*
VUME	*Vulpia megalura*
MECR	*Mesembryanthemum crystallinum*
ATSE	*Atriplex simibaccata*
PTDR	*Pterostegia drymarioides*
ERCO	*Eriophyllum confertiflorum*
BRTR	*Bromus trinii*
COFI	*Corethrogyne filaginifolia*
STLE	*Stipa lepida*
BRDI	*Bromus diandrus*
COGI	*Coreopsis gigantea*
LODE	*Lotus dendroideus*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

MIDDLE ANACAPA ISLAND 03

TRANSECT LOCATION: Former Santa Barbara Botanical Garden transect. West of High Point,east of Sheep Camp.

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 130

PLANT COMMUNITY: Grassland

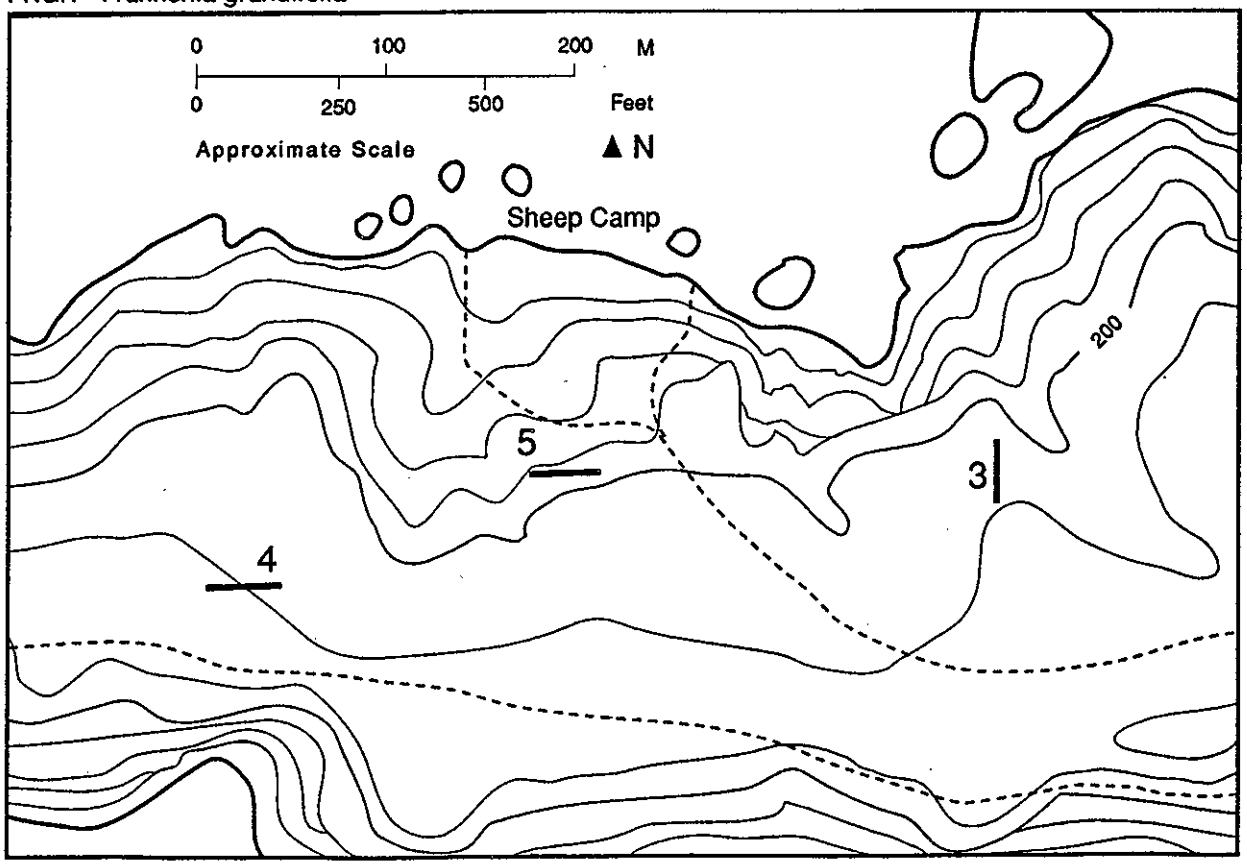
ELEVATION: 240 ft.

SLOPE ASPECT: 352°

SLOPE: S1/2 = 12°
N1/2 = 1°

SPECIES AND CODES:

STPU	*Stipa pulchra*
DUCA	*Dudleya caespitosa*
AVBA	*Avena barbata*
BRRU	*Bromus rubens*
VUDE	*Vulpia dertonensis*
ERAR	*Eriogonum arborescens*
DIPU	*Dichelostemma pulchella*
BRDI	*Bromus diandrus*
GRLA	*Grindelia latifolia*
FRGR	*Frankenia grandifolia*
HECL	*Hemizonia clementina*
BRMO	*Bromus mollis*
SOOL	*Sonchus oleraceus*
LODE	*Lotus dendroideus*
COGI	*Coreopsis gigantea*
OPPR	*Opuntia prolifera*
CAMA	*Calystegia macrostegia*
GAAP	*Galium aparine*
LACH	*Lasthenia chrysostoma*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

MIDDLE ANACAPA ISLAND 04

TRANSECT LOCATION: Southwest of Sheep Camp.

TRANSECT SAMPLE DIRECTION: W-E

NUMBER OF POINTS: 100

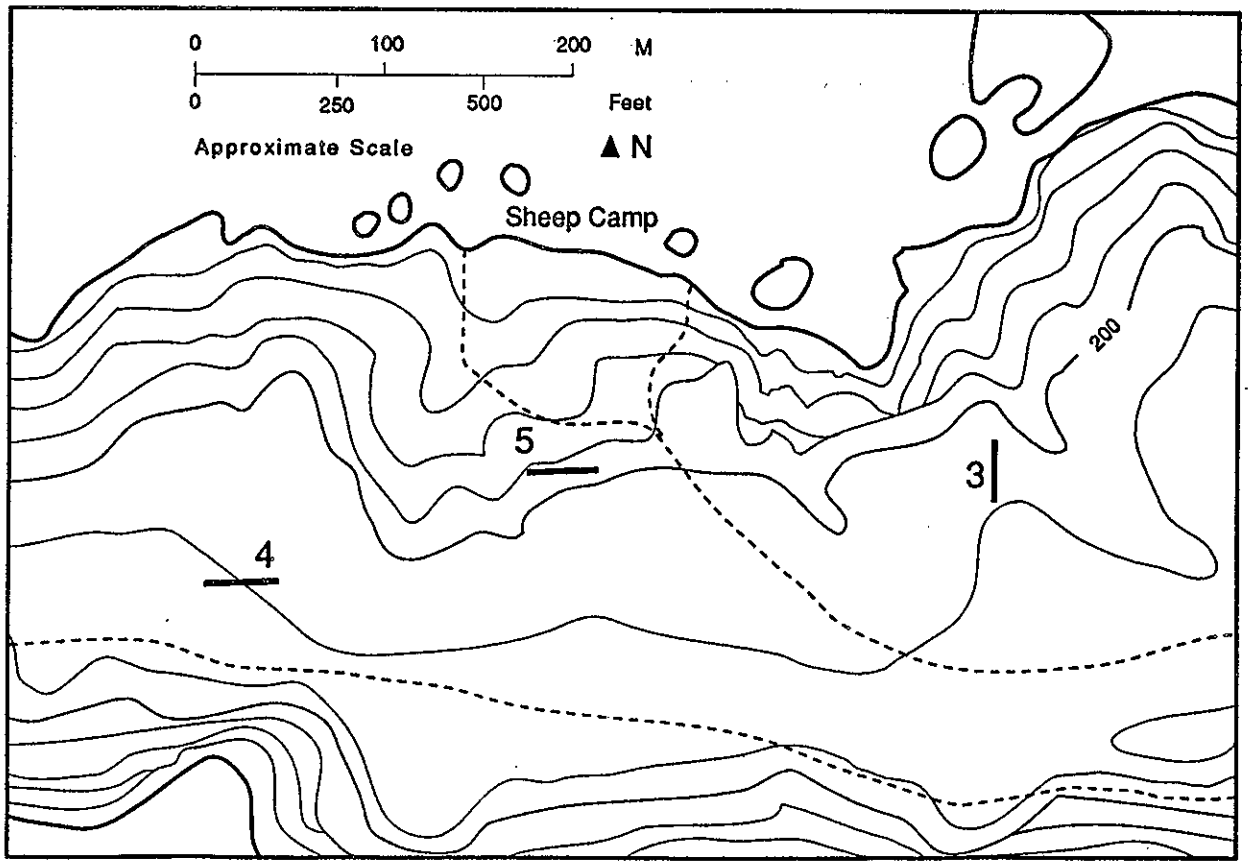
PLANT COMMUNITY: Grassland

ELEVATION: 240 ft.

SLOPE ASPECT: 10° SLOPE: 3°

SPECIES AND CODES:

AVBA	*Avena barbata*
BRMO	*Bromus mollis*
HOGL	*Hordeum murinum* ssp. *glaucum*
GRLA	*Grindelia latifolia*
VUDE	*Vulpia dertonensis*
BRRU	*Bromus rubens*
ATSE	*Atriplex semibaccata*
MEIN	*Melilotus indicus*
BRDI	*Bromus diandrus*
FRGR	*Frankenia grandifolia*
SOOL	*Sonchus oleraceus*
DUCA	*Dudleya caespitosa*
OPPR	*Opuntia prolifera*
BRTR	*Bromus trinii*
MEPO	*Medicago polymorpha*
DIPU	*Dichelostemma pulchella*
MEHI	*Medicago hispida*
STPU	*Stipa pulchra*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

MIDDLE ANACAPA ISLAND 05

TRANSECT LOCATION: Just southeast of Eucalyptus grove.

TRANSECT SAMPLE DIRECTION: W-E

NUMBER OF POINTS: 100

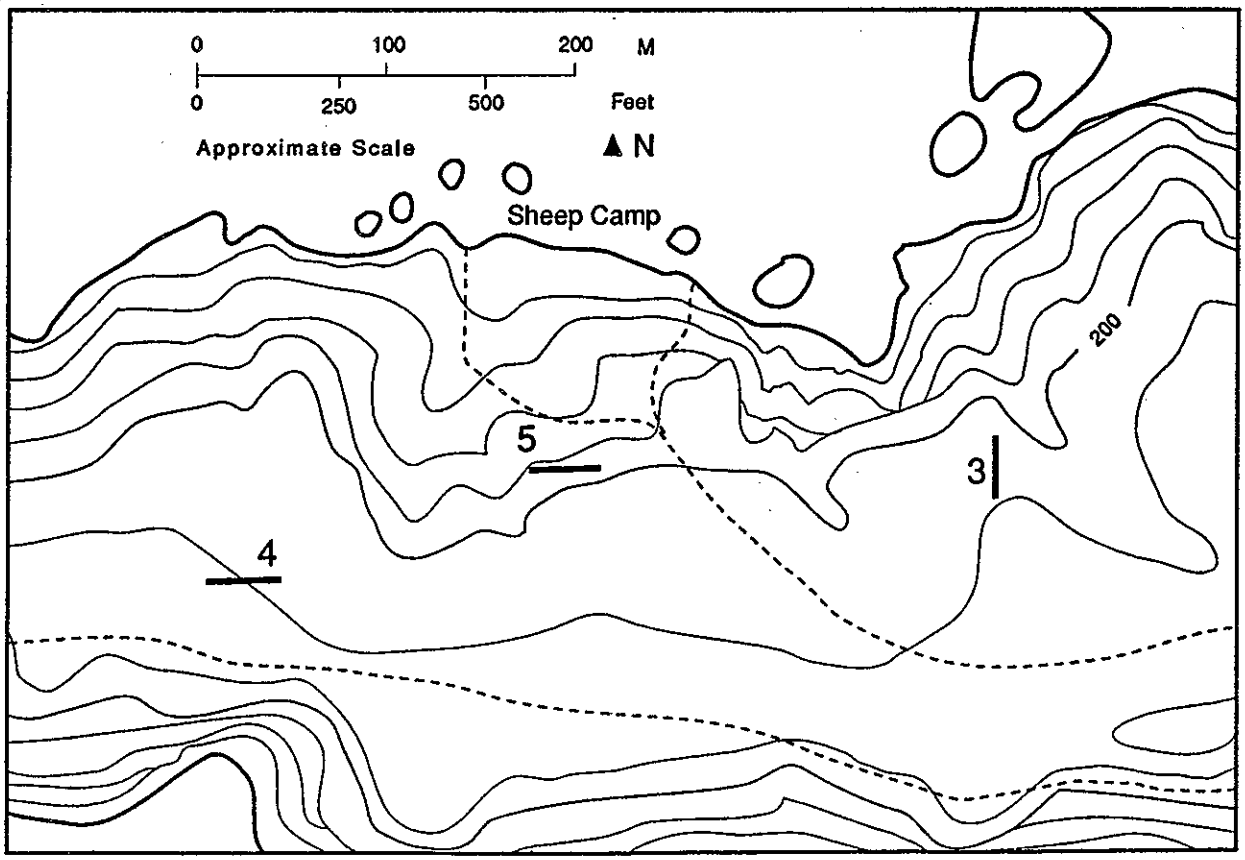
PLANT COMMUNITY: Grassland

ELEVATION: 160 ft.

SLOPE ASPECT: 351° SLOPE: 8°

SPECIES AND CODES:

STPU	*Stipa pulchra*
VUDE	*Vulpia dertonensis*
AVBA	*Avena barbata*
DUCA	*Dudleya caespitosa*
DIPU	*Dichelostemma pulchella*
BRMO	*Bromus mollis*
GRLA	*Grindelia latifolia*
GAAP	*Galium aparine*
HECL	*Hemizonia clementina*
COGI	*Coreopsis gigantea*
BRRU	*Bromus rubescens*
SAAR	*Sanicula arguta*
ERCO	*Eriophyllum confertiflorum*
LODE	*Lotus dendroideus*
ACMI	*Achillea millefolium*
FRGR	*Frankenia grandifolia*
CAAF	*Castilleja affinis*
ERST	*Eriophyllum staechadifolium*
TRAM	*Trifolium amplectens*
DAPU	*Daucus pusillus*
SOOL	Sonchus oleraceus
TRTR	*Trifolium tridentatum*
BRDI	*Bromus diandrus*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

WEST ANACAPA ISLAND 01

TRANSECT LOCATION: South and below ridge trail, west of Camel Peak.

TRANSECT SAMPLE DIRECTION: W-E

NUMBER OF POINTS: 100

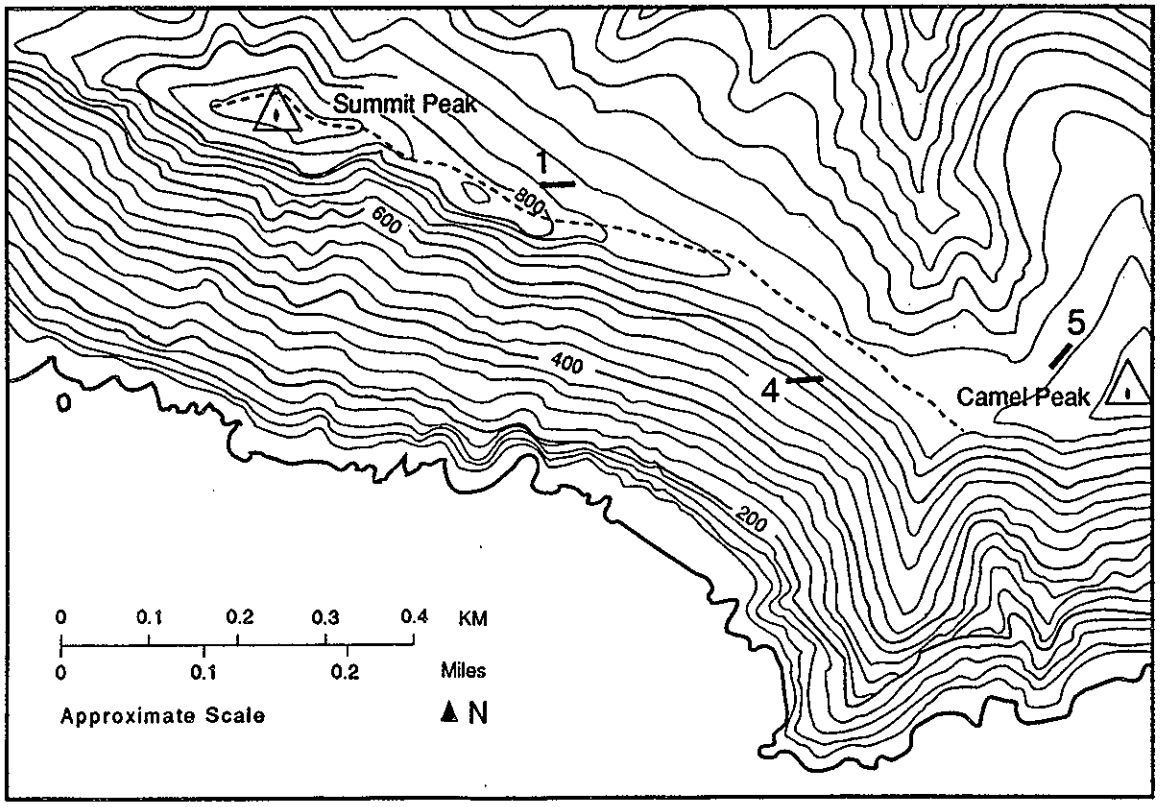
PLANT COMMUNITY: *Coreopsis* scrub

ELEVATION: 740 ft.

SLOPE ASPECT: 15° SLOPE: 20°

SPECIES AND CODES:

STPU	*Stipa pulchra*
ERAR	*Eriogonum arborescens*
VUDE	*Vulpia dertonensis*
DIPU	*Dichelostemma pulchella*
COGI	*Coreopsis gigantea*
DUCA	*Dudleya caespitosa*
PEAN	*Pellaea andromedaefolia*
ERST	*Eriophyllum staechadifolium*
BRRU	*Bromus rubens*
BRMO	*Bromus mollis*
ARCA	*Artemisisa californica*
AVBA	*Avena barbata*
SAAR	*Sanicula arguta*
ZIFR	*Zigadenus fremontii*
GAAP	*Galium aparine*
TRTR	*Trifolium tridentatum*
DAPU	*Daucus pusillus*
PITR	*Pityrogramma triangularis*
LODE	*Lotus dendroideus*
BRTR	*Bromus trinii*
BRDI	*Bromus diandrus*
ATCA	*Atriplex californica*
POSC	*Poa scabrella*
PTDR	*Pterostegia drymarioides*
TRAM	*Trifolium amplectans*
SIGA	*Silene gallica*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

WEST ANACAPA ISLAND 02

TRANSECT LOCATION: On terrace east of lower Oak Canyon.

TRANSECT SAMPLE DIRECTION: W-E

NUMBER OF POINTS: 100

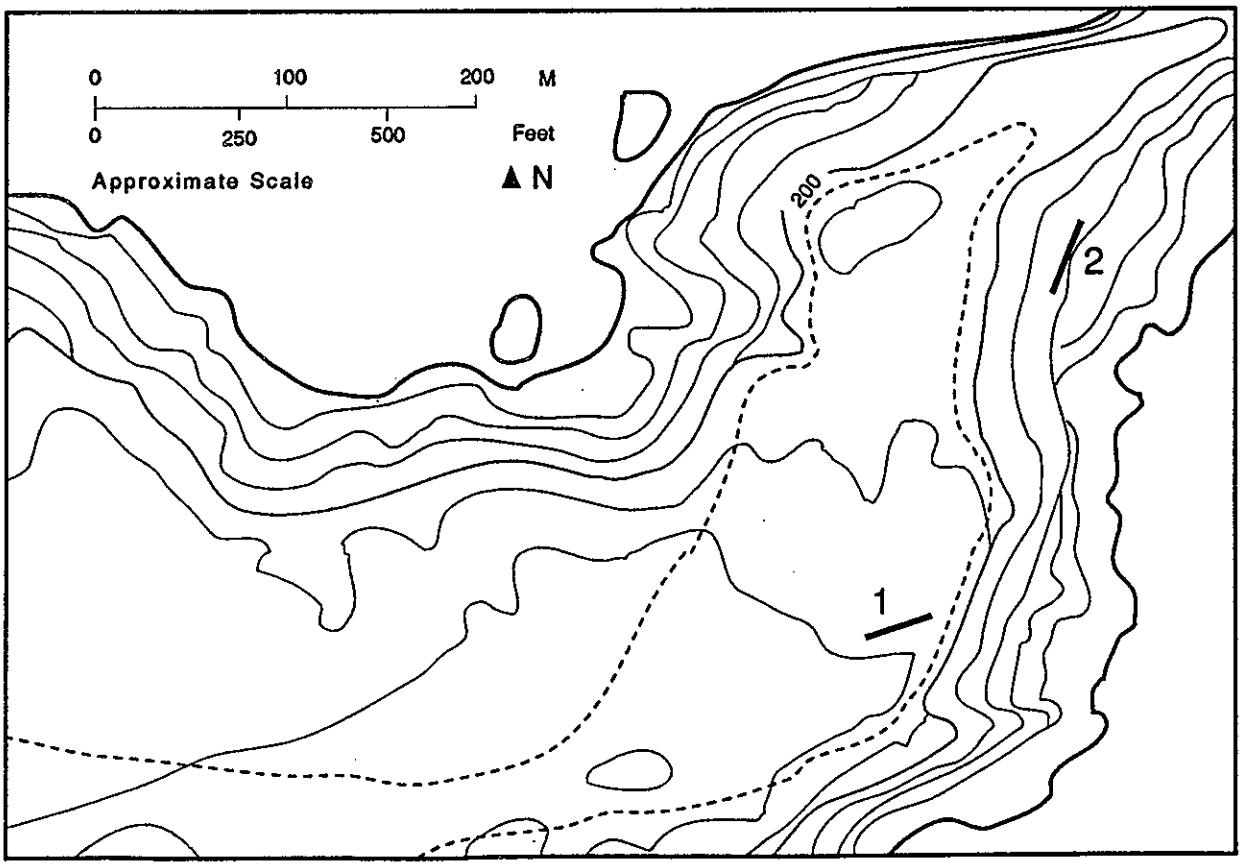
PLANT COMMUNITY: *Coreopsis* Scrub

ELEVATION: 340 ft.

SLOPE ASPECT: 355° SLOPE: 16°

SPECIES AND CODES:

ARCA	*Artemisia californica*
BRDI	*Bromus diandrus*
COFI	*Corethrogyne filaginifolia*
BAPI	*Baccharis pilularis*
COGI	*Coreopsis gigantea*
MAMA	*Marah macrocarpa*
AVBA	*Avena barbata*
LODE	*Lotus dendroideus*
ERST	*Eriophyllum staechadifolium*
ACMI	*Achillea millefolium*
HOGL	*Hordeum murinum* ssp. *glaucum*
ERGR	*Eriogonum grande*
HOBR	*Hordeum brachyantherum*
SAAR	*Sanicula arguta*
BRMO	*Bromus mollis*
SOOL	*Sonchus oleraceus*
CLPE	*Claytonia perfoliata*
AVFA	*Avena fatua*
PTDR	*Pterostegia drymarioides*
GAAP	*Gallium aparine*
BRTR	*Bromus trinii*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

WEST ANACAPA ISLAND 03

TRANSECT LOCATION: East facing slope of Summit Canyon.

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

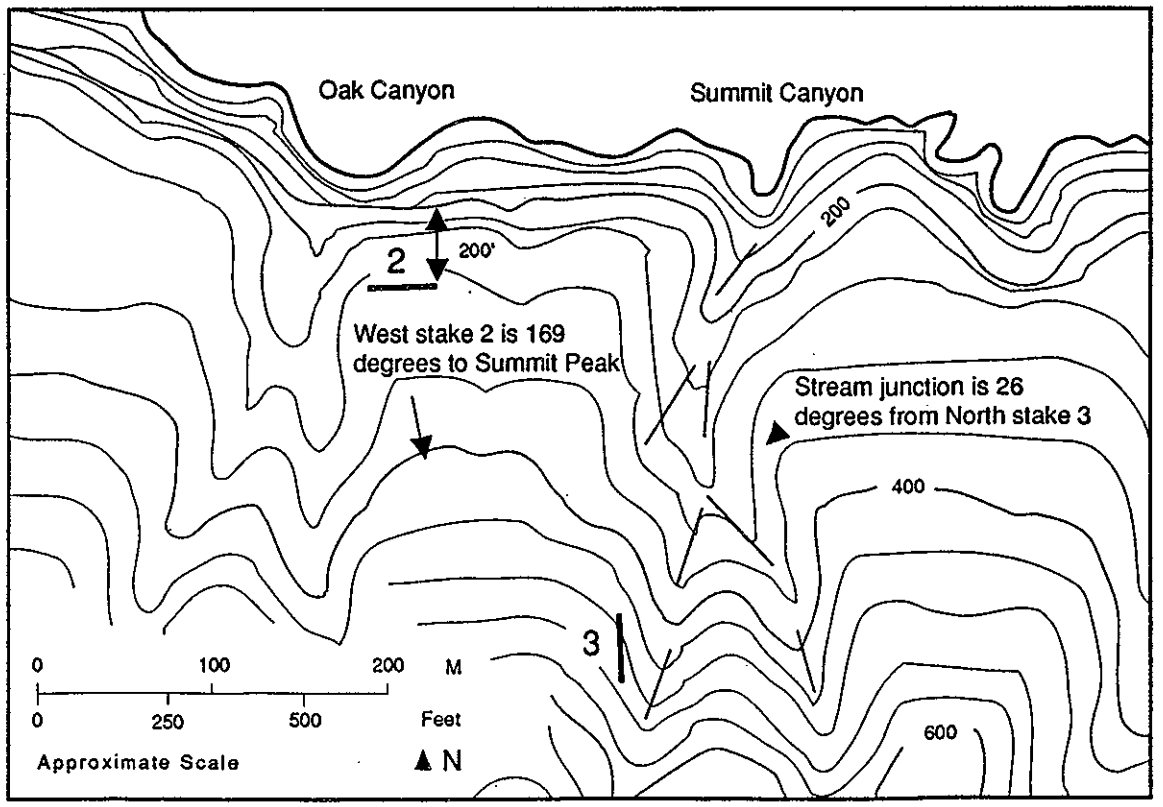
PLANT COMMUNITY: Coastal Sage Scrub

ELEVATION: 480 ft.

SLOPE ASPECT: 80° SLOPE: 36°

SPECIES AND CODES:

ERST	*Eriophyllum stachaedifolium*	BRRU	*Bromus rubens*
LATH	*Lathyrus laetiflorus*	SILM	*Silene laciniata major*
DIPA	*Diplacus parviflorus*	STPU	*Stipa pulchra*
ERGR	*Eriogonum grande*	VUDE	*Vulpia dertonensis*
POCA	*Polypodium californicum*	COFI	*Corethrogyne filaginifolia*
CAMA	*Calystegia macrostegia*	ERGI	*Eriogonum giganteum*
PEAN	*Pellaea andromedaefolia*	BRTR	*Bromus trinii*
DUCA	*Dudleya caespitosa*	SAAR	*Sanicula arguta*
ZACA	*Zauschneria californica*	COGI	*Coreopsis gigantea*
LODE	*Lotus dendroideus*	PTDR	*Pterostegia drymarioides*
HADE	*Haplopappus detonsus*	MAMA	*Marah macrocarpa*
LUAL	*Lupinus albifrons*	AVBA	*Avena barbata*
SILA	*Silene laciniata*	CAAF	*Castilleja affinis*
ACMI	*Achillea millefolium*	SOOL	*Sonchus oleraceus*
ARCA	*Artemisia californica*	CRER	*Tillaea erecta*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

WEST ANACAPA ISLAND 04

TRANSECT LOCATION: South slope west of Camel Peak, above Cat Rock.

TRANSECT SAMPLE DIRECTION: W-E

NUMBER OF POINTS: 100

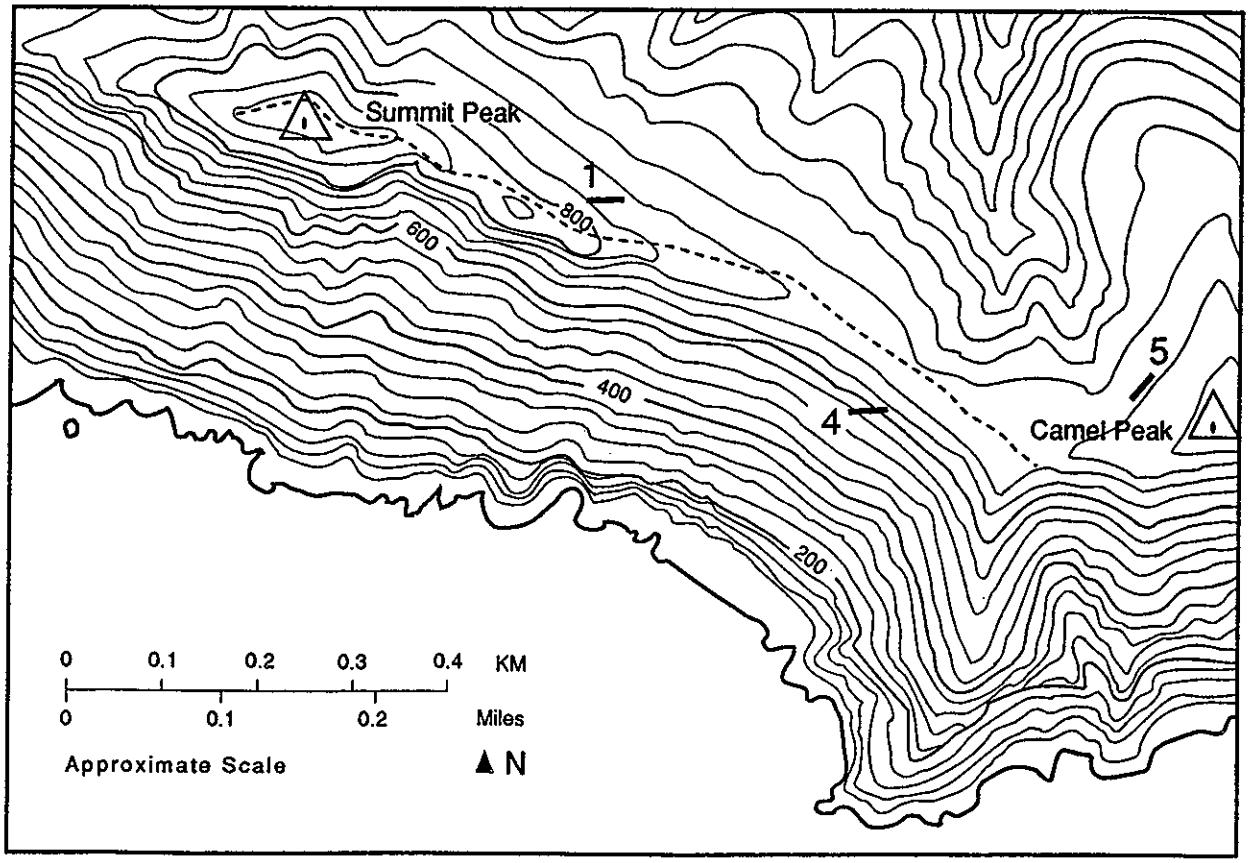
PLANT COMMUNITY: Coastal Sage Scrub

ELEVATION: 600 ft.

SLOPE ASPECT: 190° SLOPE: 39°

SPECIES AND CODES:

ENCA	*Encelia californica*	BRMO	*Bromus mollis*
OPLI	*Opuntia littoralis*	BRRU	*Bromus rubens*
ARCA	*Artemisia californica*	MUMI	*Muhlenbergia microsperma*
CAMA	*Calystegia macrostegia*	PHDI	*Phacelia distans*
MAMA	*Marah macrocarpa*	ERAR	*Eriogonum arborescens*
HOGL	*Hordeum murinum* ssp. *glaucum*	AGSP	*Agrostis* sp.



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

WEST ANACAPA ISLAND 05

TRANSECT LOCATION: West facing slope of Camel Peak.

TRANSECT SAMPLE DIRECTION: S-N

NUMBER OF POINTS: 100

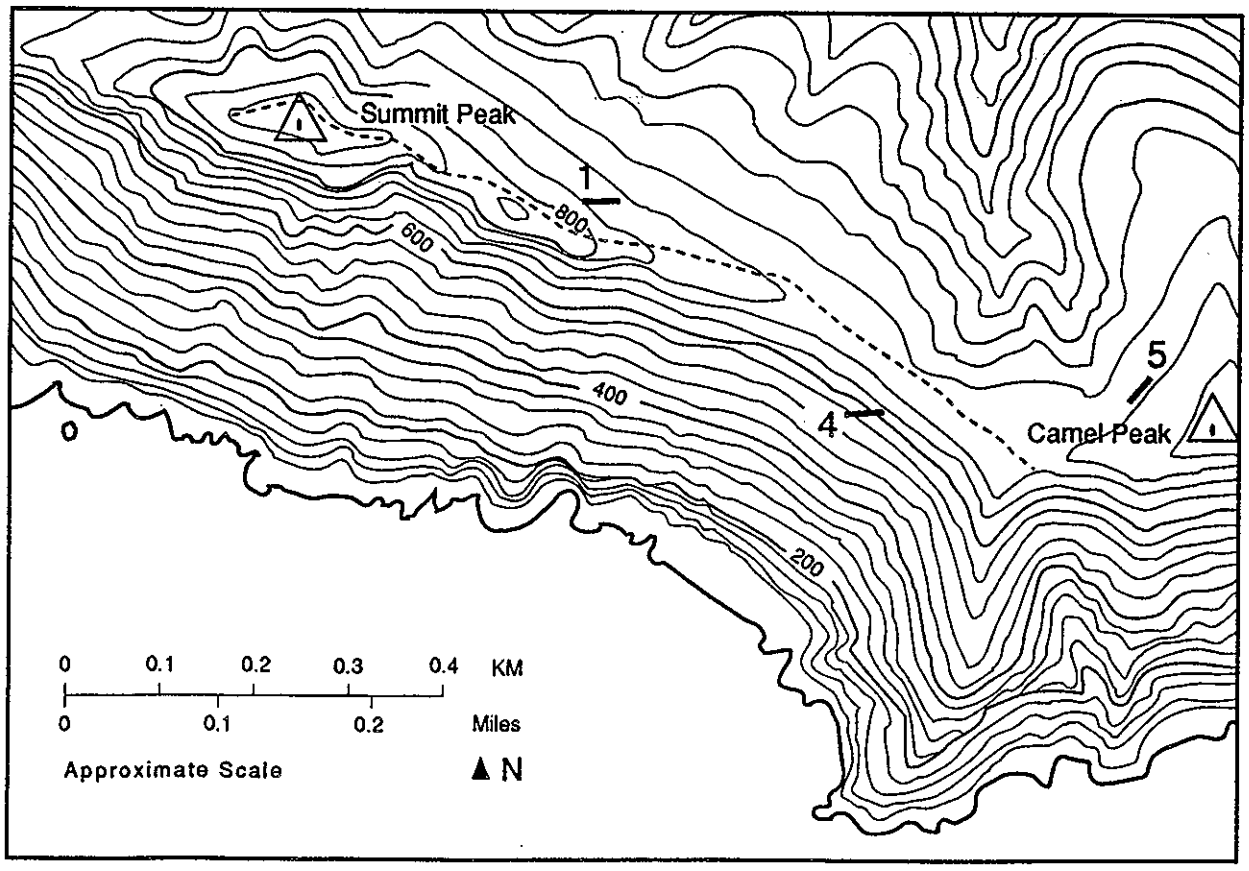
PLANT COMMUNITY: Grassland

ELEVATION: 720 ft.

SLOPE ASPECT: 332° SLOPE: 13°

SPECIES AND CODES:

STPU	*Stipa pulchra*	MEPO	*Medicago polymorpha*
AVBA	*Avena barbata*	AMIN	*Amsinkia intermedia*
BRMO	*Bromus mollis*	BRCA	*Bromus carinatus*
VUDE	*Vulpia dertonensis*	HOGL	*Hordeum murinum* ssp. *glaucum*
DIPU	*Dichelostemma pulchella*	BRRU	*Bromus rubens*
AVFA	*Avena fatua*	GINE	*Gillia nevinii*
ERAR	*Eriogonum arborescens*	SIGA	*Silene gallica*
DUCA	*Dudleya caespitosa*	ERCI	*Erodium cicutarium*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

WEST ANACAPA ISLAND 06

TRANSECT LOCATION: On the the bench on the far west end.

TRANSECT SAMPLE DIRECTION: W-E

NUMBER OF POINTS: 100

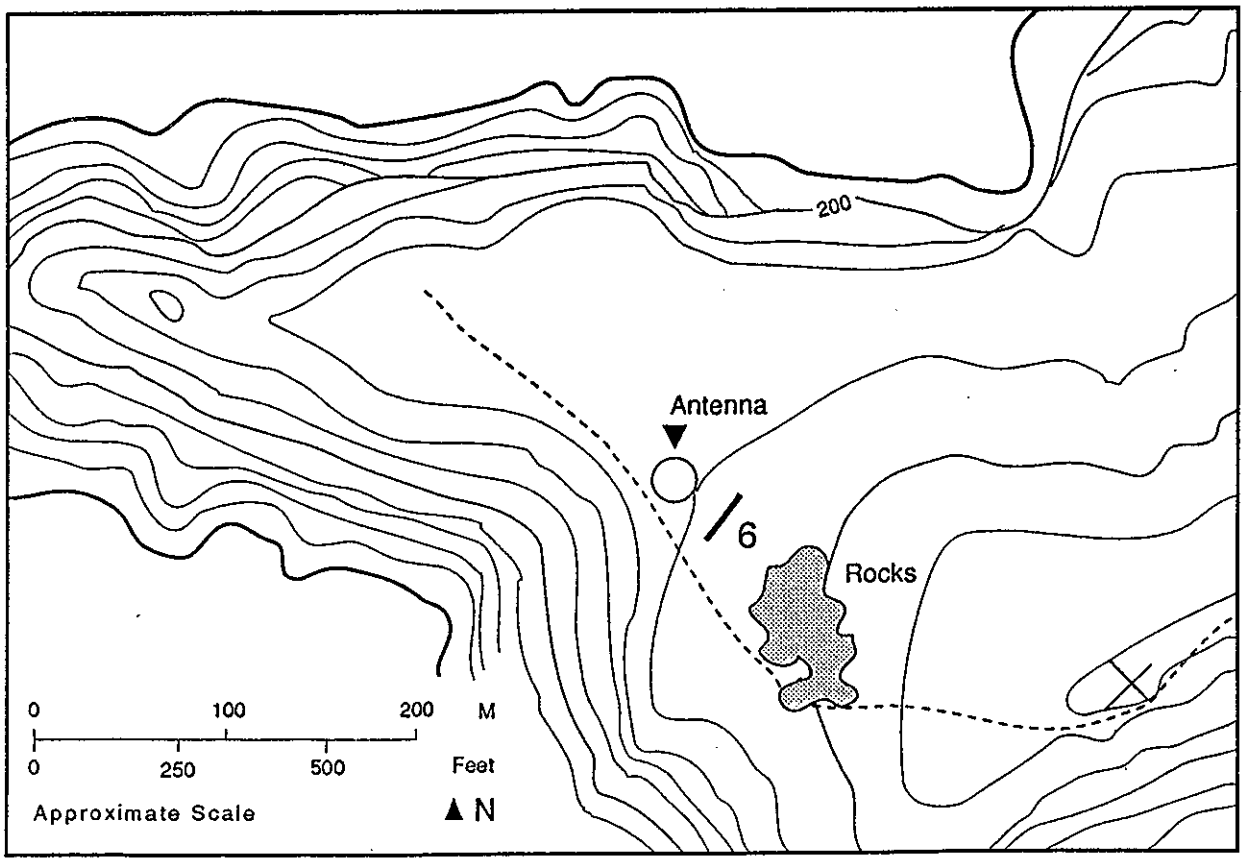
PLANT COMMUNITY: Grassland

ELEVATION: 340 ft.

SLOPE ASPECT: 296° SLOPE: 2°

SPECIES AND CODES:

STPU	*Stipa pulchra*
BRDI	*Bromus diandrus*
BRMO	*Bromus mollis*
GRLA	*Grindelia latifolia*
AVBA	*Avena barbata*
GAAP	*Gallum aparine*
DIPU	*Dichelostemma pulchella*
HOCA	*Hordeum californicum*
ARCA	*Artemisia californica*
AVFA	*Avena fatua*
VUDE	*Vulpia dertonensis*
ACMI	*Achillea millefolium*
ERGR	*Eriogonum grande*
DUCA	*Dudleya caespitosa*
SOOL	*Sonchus oleraceus*
BRTR	*Bromus trinii*
MEPO	*Medicago polymorpha*
HECL	*Hemizonia clementina*
BRRU	*Bromus rubens*



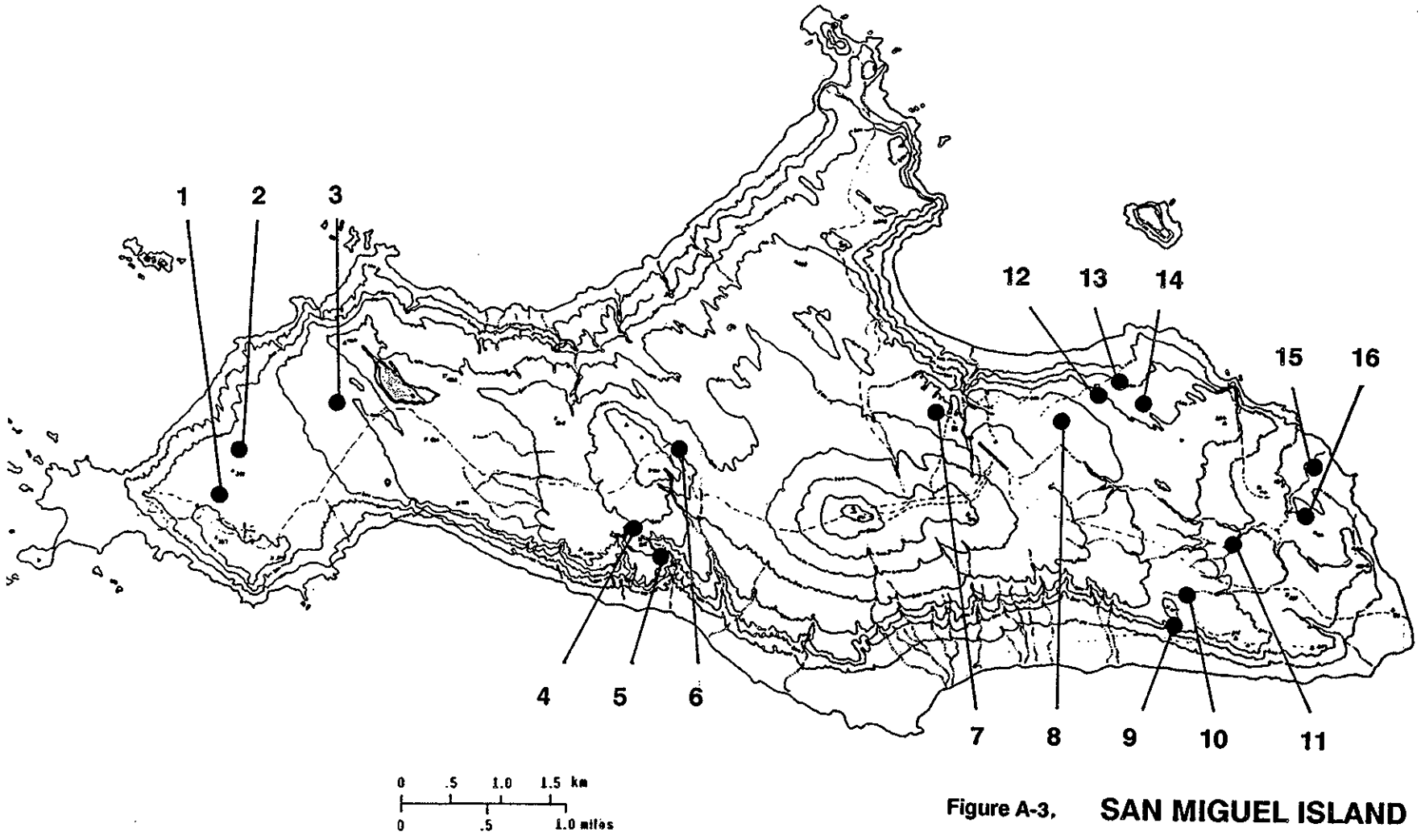


Figure A-3. **SAN MIGUEL ISLAND**

Vegetation Transect Locations

VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 01

TRANSECT LOCATION: Caliche flats northeast of the Research Station

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

PLANT COMMUNITY: Caliche Scrub

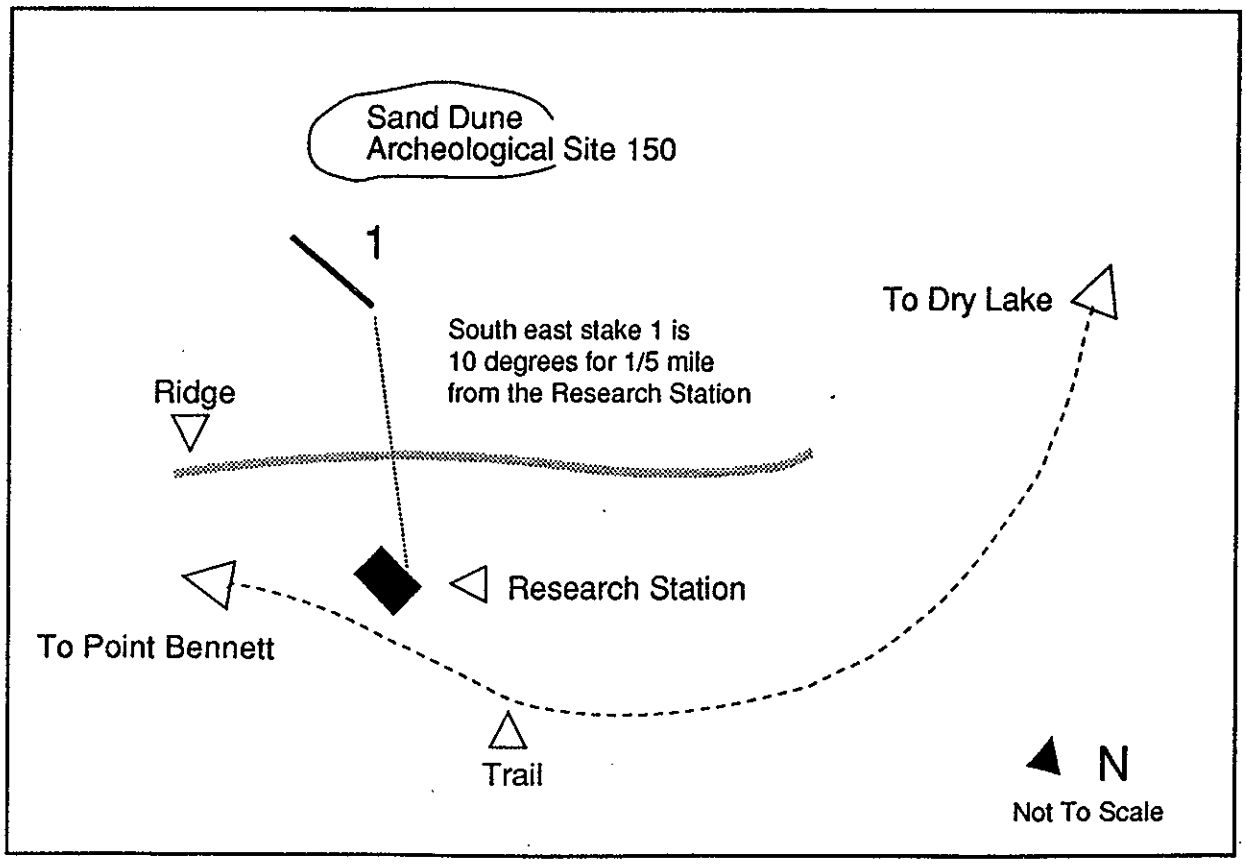
ELEVATION: 300 ft.

SLOPE ASPECT: 8°

SLOPE: 3°

SPECIES AND CODES:

PAIN	*Parapholis incurva*
CAAE	*Carpobrotus aequilateris*
HOCA	*Hordeum californicum*
SEVU	*Senecio vulgaris*
SPMA	*Spergularia macrotheca*
SIBE	*Sisyrinchium bellum*
ERGL	*Erigeron glaucus*
MENO	*Mesembryanthemum nodiflorum*
ASMI	*Astragulus miguelensis*
MEPO	*Medicago polymorpha*
HOLE	*Hordeum murinum* ssp. *leporinum*
ERCI	*Erodium cicutarium*
SOOL	*Sonchus oleraceus*
HOGL	*Hordeum murinum* ssp. *glaucum*
ATCA	*Atriplex californica*
MEIN	*Meliotus indicus*
CAMA	*Calystegia macrostegia*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 02

TRANSECT LOCATION: Caliche flats northeast of Ranger Station, Northeast of SMI 01.

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

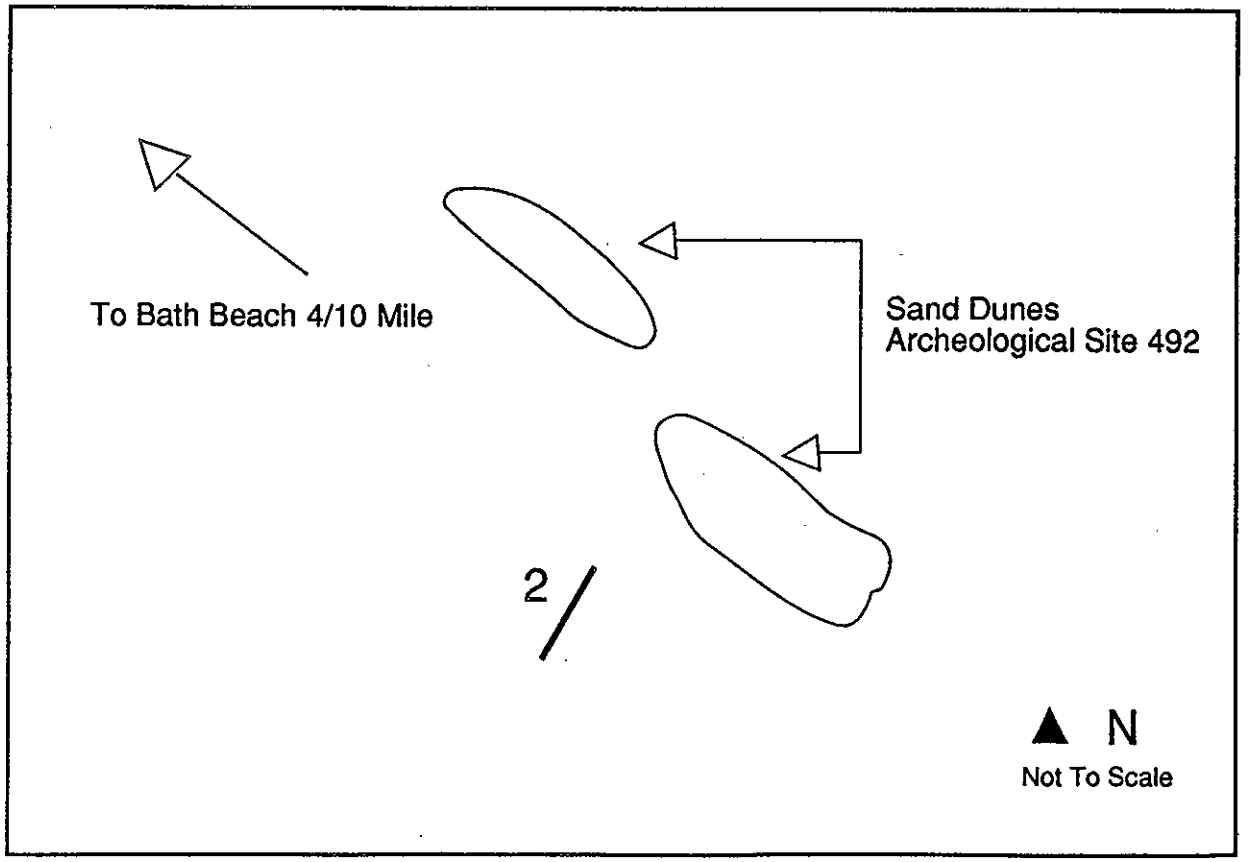
PLANT COMMUNITY: Caliche Scrub

ELEVATION: 235 ft.

SLOPE ASPECT: 240° SLOPE: 1°

SPECIES AND CODES:

PAIN	*Parapholis incurva*	MEPO	*Medicago polymorpha*
ERGL	*Erigeron glaucus*	HOCA	*Hordeum californicum*
ATCA	*Atriplex californica*	MEIN	*Melilotus indicus*
ERCI	*Erodium cicutarium*	SPMA	*Spergularia macrotheca*
ASMI	*Astragulus miguelensis*	CAAE	*Carpobrotus aeguilateris*
MENO	*Mesembryanthemum nodiflorum*	SEVU	*Senecio vulgaris*
SOOL	*Sonchus oleraceus*	CAMA	*Calystegia macrostegia*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 03

TRANSECT LOCATION: Second swale west of dry lake bed

TRANSECT SAMPLE DIRECTION: NE-SW

NUMBER OF POINTS: 100

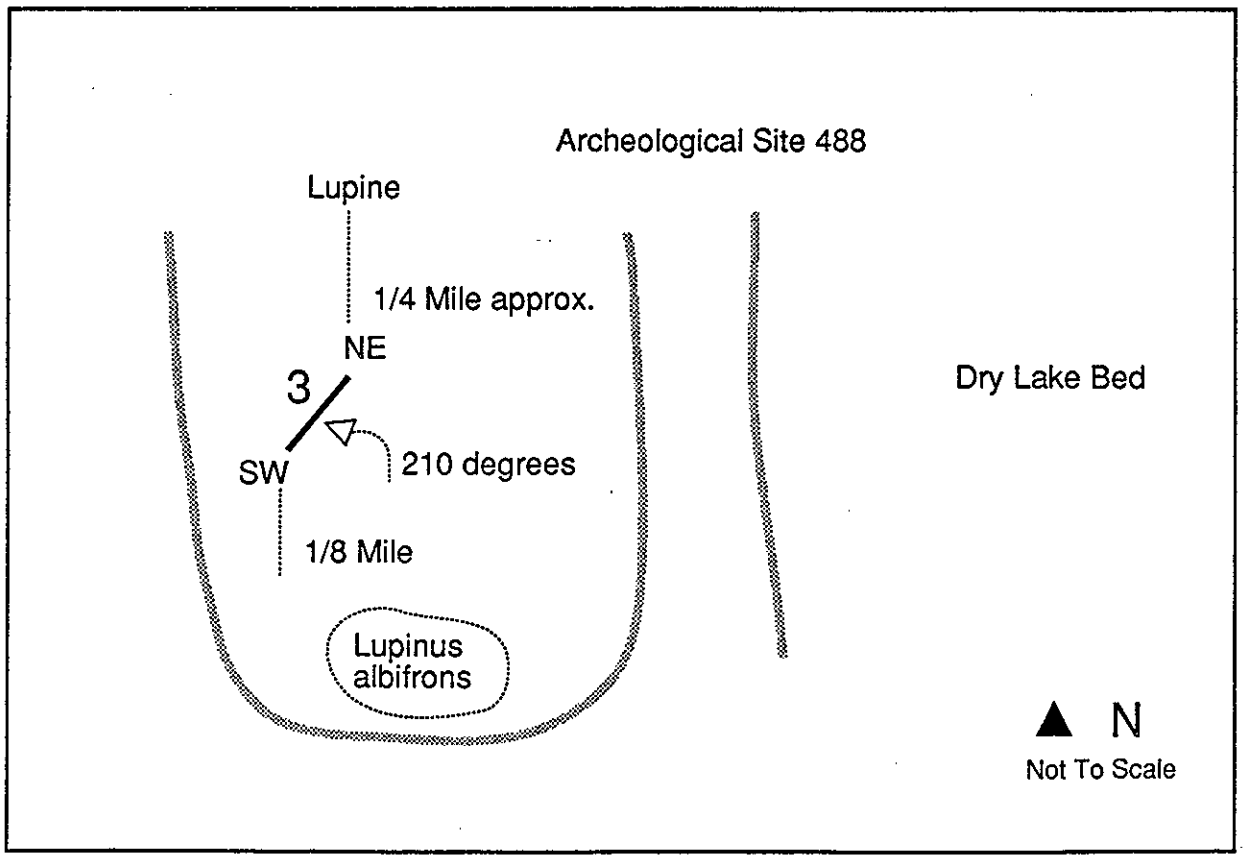
PLANT COMMUNITY: Grassland

ELEVATION: 375 ft.

SLOPE ASPECT: 315° SLOPE: 2°

SPECIES AND CODES:

BRDI	*Bromus diandrus*
BRMO	*Bromus mollis*
ASMI	*Astragulus miguelensis*
ATCA	*Atriplex californica*
HOCA	*Hordeum californicum*
PODO	*Poa douglasii*
CAMA	*Calystegia macrostegia*
CAAE	*Carpobrotus aequilateris*
MEIN	*Melilotus indicus*
MASU	*Malacothrix succulentus*
CIOC	*Circium occidentale*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 04

TRANSECT LOCATION: Southwest of Green Mountain, between two drainages closest to the trail

TRANSECT SAMPLE DIRECTION: E-W

NUMBER OF POINTS: 100

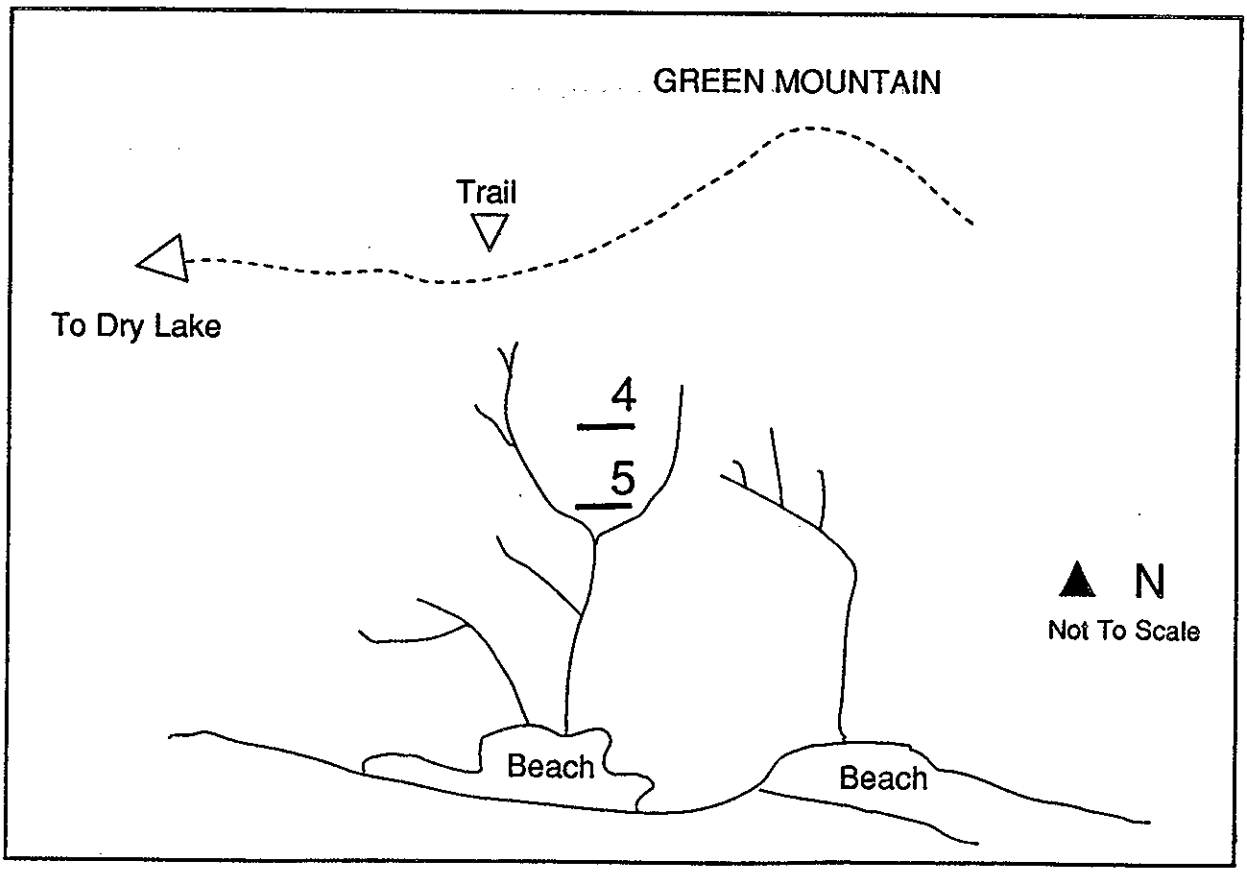
PLANT COMMUNITY: Grassland

ELEVATION: 550 ft.

SLOPE ASPECT: 180° SLOPE: 2°

SPECIES AND CODES:

STPU	*Stipa pulchra*	SOOL	*Sonchus oleraceus*
BRDI	*Bromus diandrus*	HOLE	*Hordeum murinum* ssp. *leporinum*
AVBA	*Avena barbata*	ERCI	*Erodium cicutarium*
GAAP	*Galium aparine*	MEPO	*Medicago polymorpha*
AMIN	*Amsinkia intermedia*	STME	*Stellaria media*
BRMO	*Bromus mollis*	CLPE	*Claytonia perfoliata*
HOCA	*Hordeum californicum*	PODO	*Poa douglasii*
ATSE	*Atriplex semibaccata*	SEVU	*Senecio vulgaris*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 05

TRANSECT LOCATION: Southwest of Green Mountain, between two drainages closest to trail, down slope toward the junction.

TRANSECT SAMPLE DIRECTION: E-W

NUMBER OF POINTS: 100

PLANT COMMUNITY: Coastal Sage Scrub

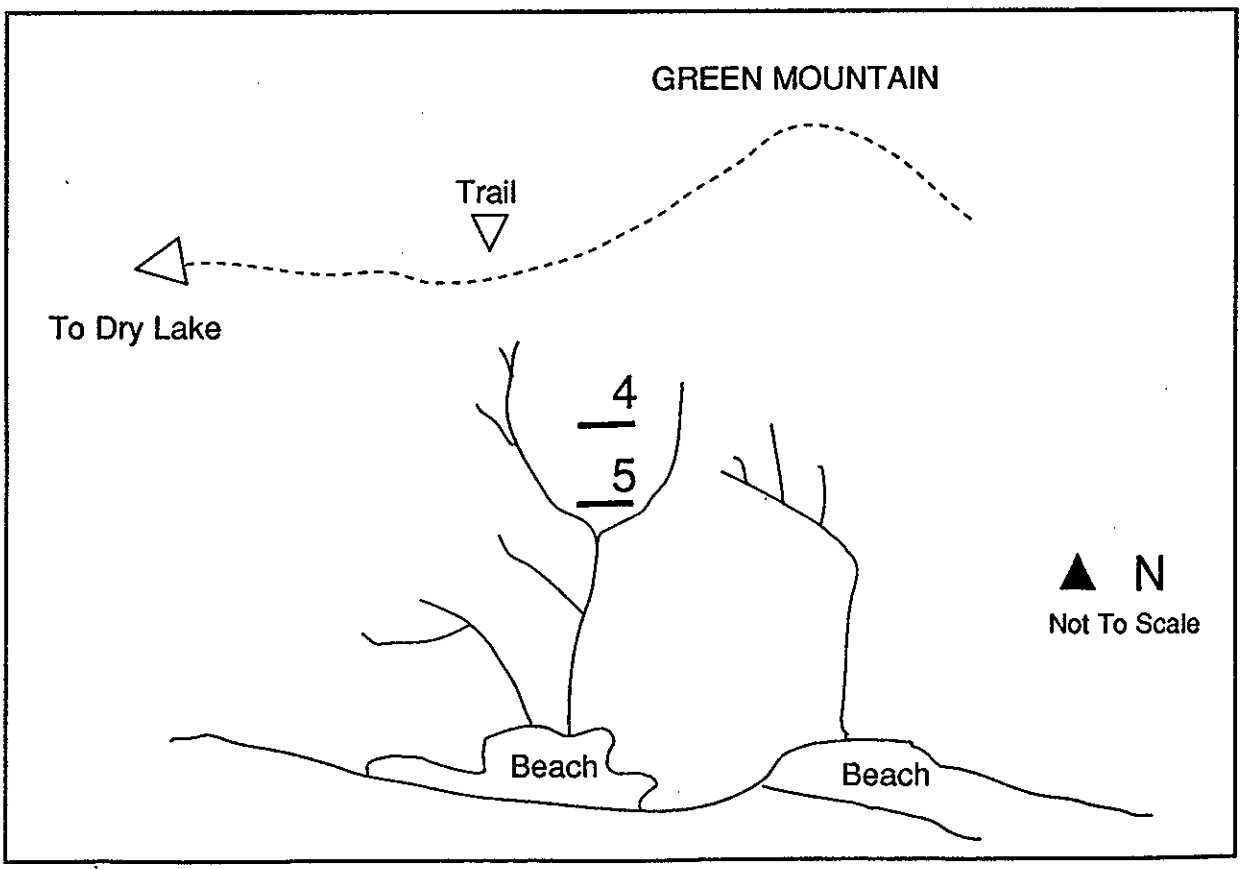
ELEVATION: 475 ft.

SLOPE ASPECT: 199°

SLOPE: W 2/3 = 34°
E 1/3 = 15°

SPECIES AND CODES:

ARCA	*Artemisia californica*
OPLI	*Opuntia littoralis*
MAMA	*Marah macrocarpa*
STPU	*Stipa pulchra*
BAPI	*Bacharris pilularis*
DIPU	*Dichelostemma pulchella*
MAVU	*Marrubium vulgare*
HOCA	*Hordeum californicum*
LOSC	*Lotus scoparius*
BRRU	*Bromus rubens*
MASA	*Malacothrix saxatilis*
CHMU	*Chenopodium californicum*
GNLU	*Gnaphallium luteo-album*
LAAU	*Lamarkia aurea*
MAIM	*Malacothrix implicata*
LODE	*Lotus dendroideus*
BRMO	*Bromus mollis*
CRER	*Tillaea erecta*
PODO	*Poa douglasii*
CAMA	*Calystegia macrostegia*
ATSE	*Atriplex semibaccata*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 06

TRANSECT LOCATION: Southeast flank of Green Mountain, just upslope from plane wreck.

TRANSECT SAMPLE DIRECTION: SW-NE

NUMBER OF POINTS: 100

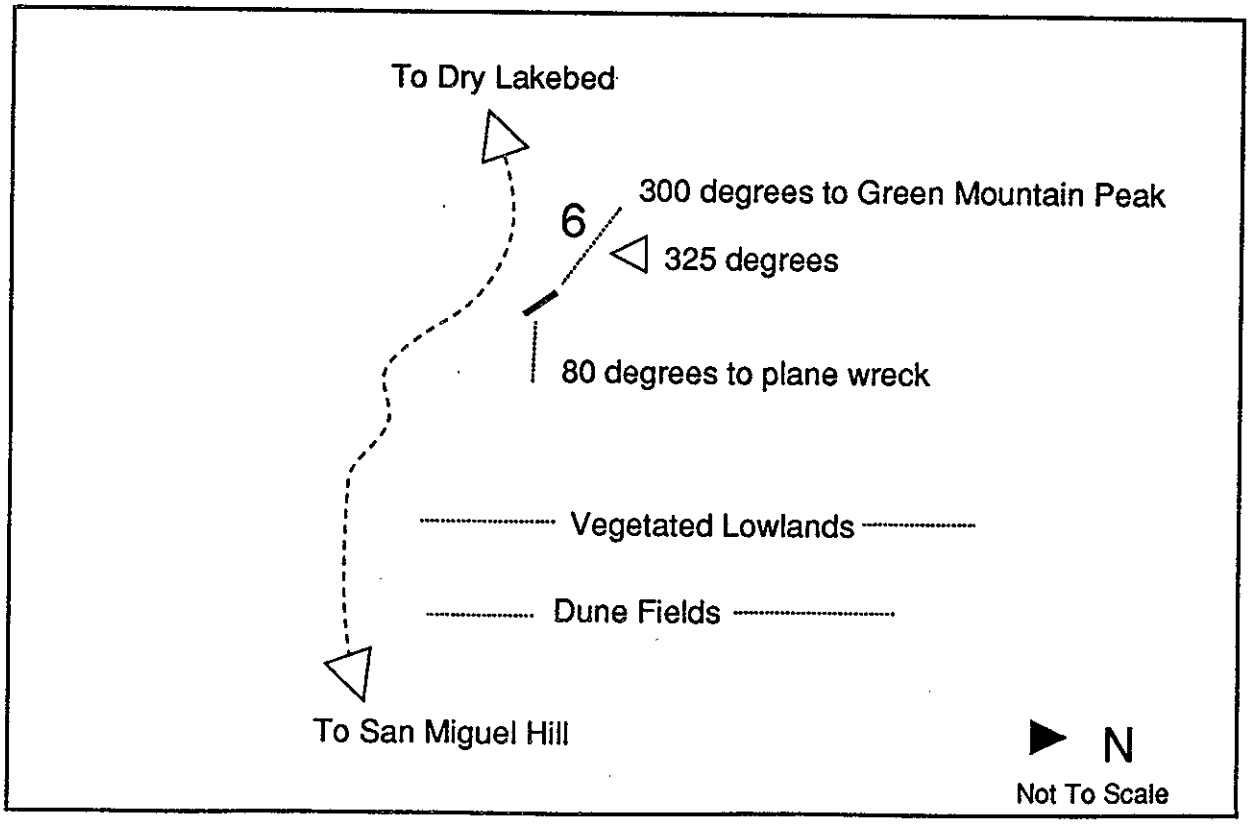
PLANT COMMUNITY: Island chaparral

ELEVATION: 625 ft.

SLOPE ASPECT: 40° SLOPE: 10°

SPECIES AND CODES:

BRDI	*Bromus diandrus*
PAIN	*Parapholis incurva*
MEPO	*Medicago polymorpha*
HAVE	*Haplopappus venetus*
BAPI	*Baccharis pilularis*
ERCI	*Erodium cicutarium*
LUSU	*Lupinus succulentus*
ATCA	*Atriplex californica*
HOLE	*Hordeum murinum* ssp. *leporinum*
SIGA	*Silene gallica*
CAAE	*Carpobrotus aequilateris*
LACH	*Lasthenia chrysostoma*
SEBI	*Selaginella biglovii*
SODO	*Solanum douglasii*
SOOL	*Sonchus oleraceus*
MEIN	*Melilotus indicus*
CLPE	*Claytonia perfoliata*
PHRA	*Pholistoma racemosum*
CRCL	*Cryptantha clevelandii*
SPMA	*Spergularia macrotheca*
DAPU	*Daucus pusillus*
PLCA	*Platystemon californicus*
GNLU	*Gnaphalium luteo-album*
BRMO	*Bromus mollis*
STME	*Stellaria media*
VUMY	*Vulpia myuros*
TONO	*Torilis nodosa*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 07

TRANSECT LOCATION: Southwest of Ranger Station and Helopad, between drainages of Nidever Canyon

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

PLANT COMMUNITY: Island chaparral

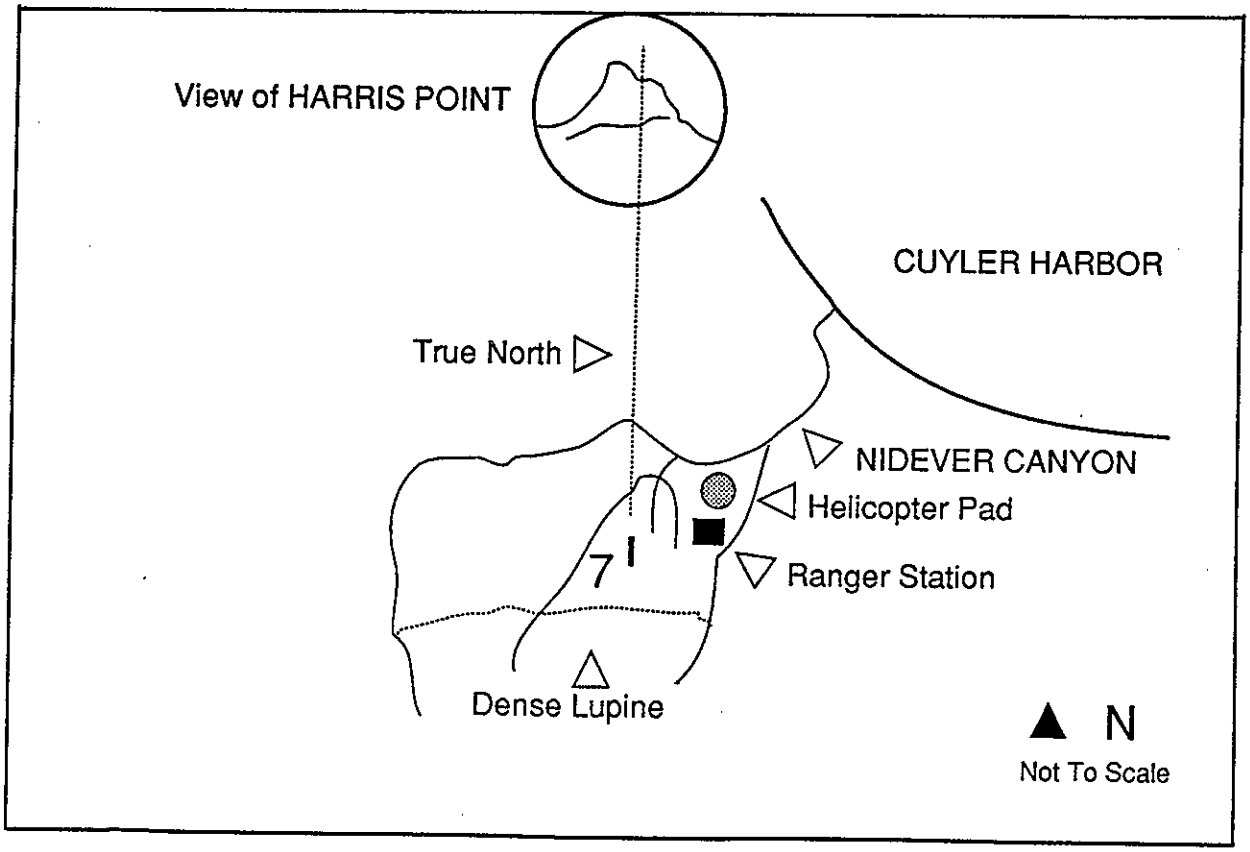
ELEVATION: 450 ft.

SLOPE ASPECT: 30°

SLOPE: 15°

SPECIES AND CODES:

BRDI	*Bromus diandrus*
HAVE	*Haplopappus venetus*
CAAE	*Carpobrotus aequilateris*
VUME	*Vulpia megalura*
ERST	*Eriophyllum staechadifolium*
LUAL	*Lupinus albifrons*
BAPI	*Baccharis pilularis*
PAIN	*Parapholis incurva*
ACMI	*Achillea millifolium*
AVBA	*Avena barbata*
HOLE	*Hordeum murinum* ssp. *leporinum*
BRMO	*Bromus mollis*
POMO	*Polypogon monspellensis*
ATCA	*Atriplex californica*
SOOL	*Sonchus oleraceus*
MEPO	*Medicago polymorpha*
ERCI	*Erodium cicutarium*
HOCA	*Hordeum californicum*
VUMY	*Vulpia myuros*
MEIN	*Melilotus indicus*
CRER	*Tillaea erecta*
CRCL	*Cryptantha clevlandii*
LACH	*Lasthenia chrysostoma*
PHRA	*Pholistoma racemosum*
DAPU	*Daucus pusillus*
GNLU	*Gnaphalium luteo-album*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 08

TRANSECT LOCATION: East of Ranger Station at the head of Willow Canyon.

TRANSECT SAMPLE DIRECTION: E-W

NUMBER OF POINTS: 100

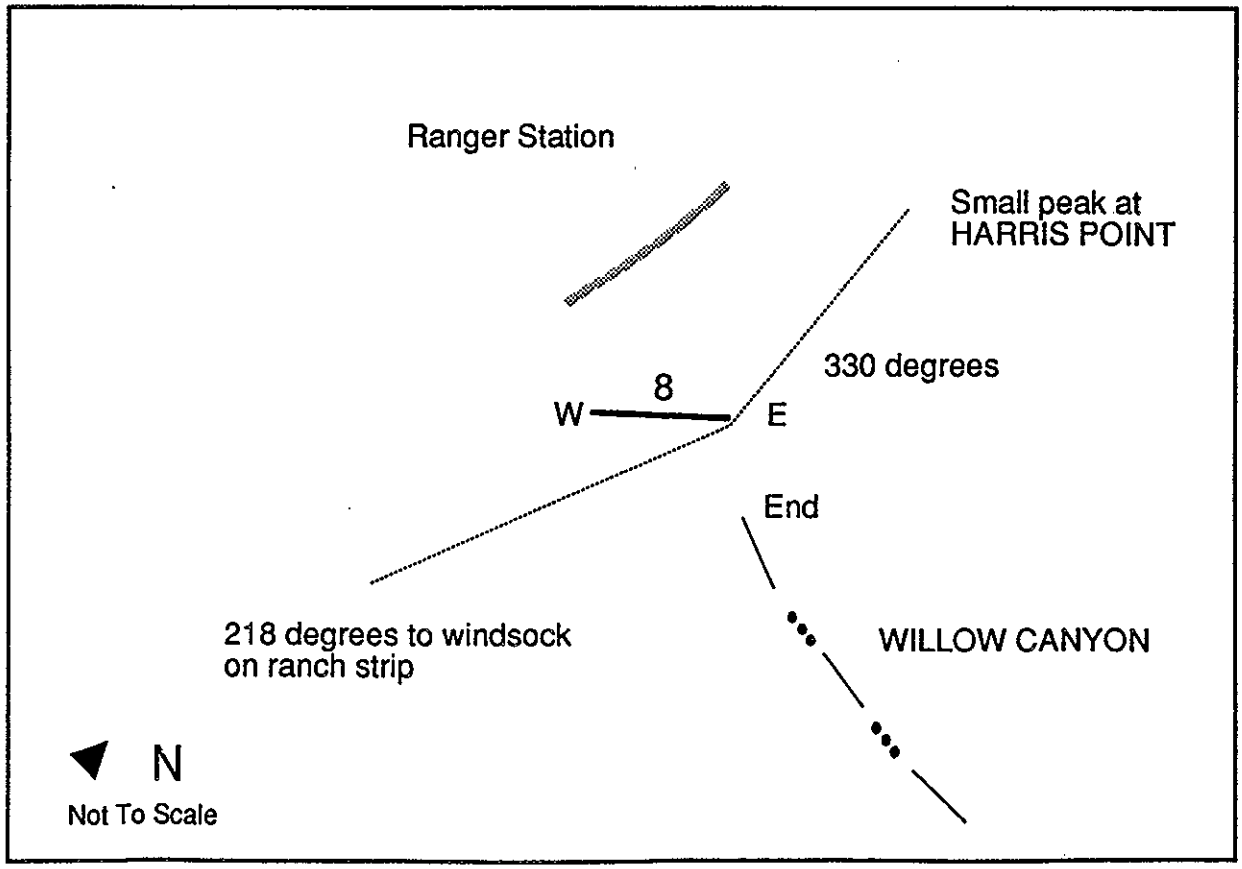
PLANT COMMUNITY: Island chaparral

ELEVATION: 450 ft.

SLOPE ASPECT: 93° SLOPE: 1°

SPECIES AND CODES:

BRDI	*Bromus diandrus*
HAVE	*Haplopappus venetus*
LUAR	*Lupinus arboreus*
ESCA	*Eschscholzia californica*
ASMI	*Astragulus miguelensis*
COGI	*Coreopsis gigantea*
MAIN	*Malacothrix incana*
CAAE	*Carpobrotus aequilateris*
ACMI	*Achillea millefolium*
NEPE	*Nemophila pedunculata*
ATCA	*Atriplex californica*
MEIN	*Meliotus indicus*
ATSE	*Atriplex semibaccata*
CIOC	*Circium occidentale*
SOOL	*Sonchus oleraceus*
AMIN	*Amsinkia intermedia*
MASU	*Malacothrix succulentus*
PTDR	*Pterostegia drymarioides*
DISP	*Distichlis spicata*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 09

TRANSECT LOCATION: Near Knox Benchmark on southeast end of Island

TRANSECT SAMPLE DIRECTION: NW-SE

NUMBER OF POINTS: 100

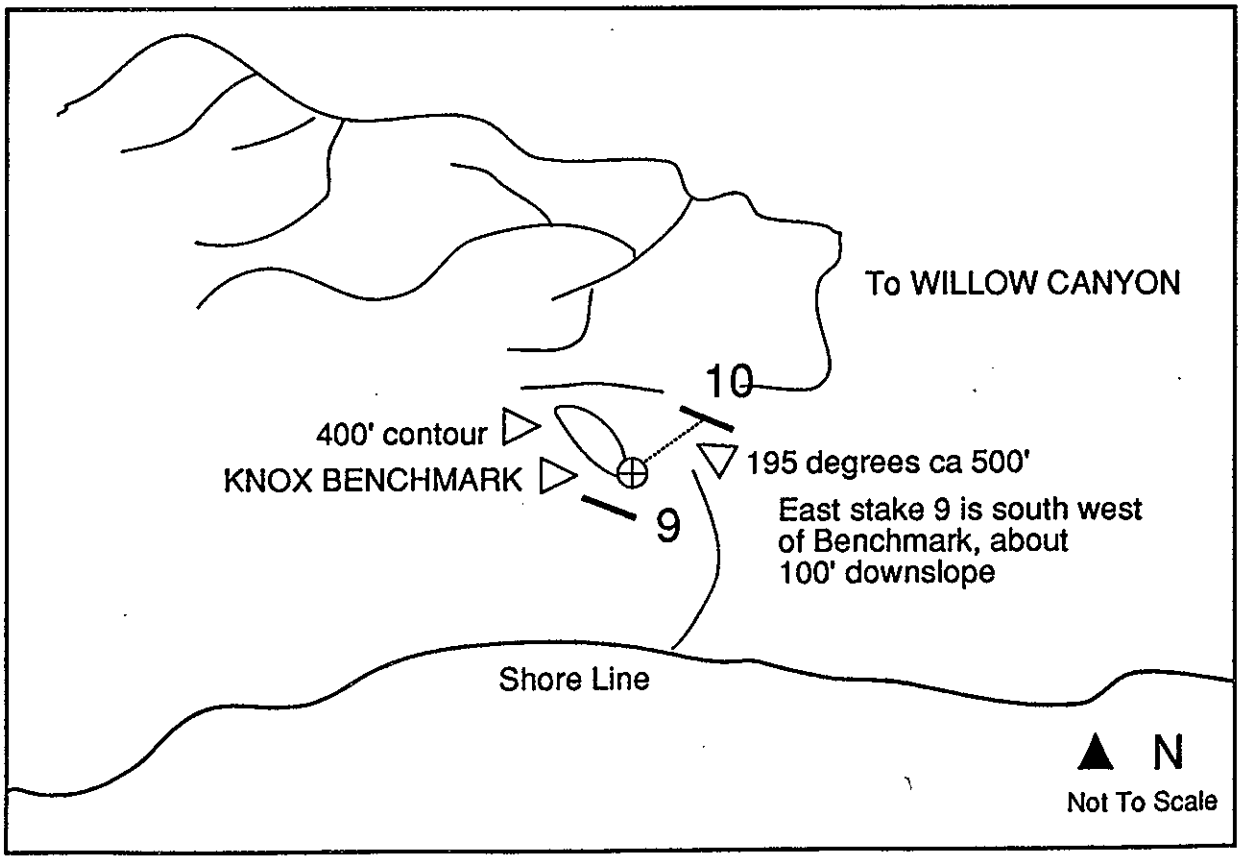
PLANT COMMUNITY: Sea cliff scrub

ELEVATION: 300 ft.

SLOPE ASPECT: 220° SLOPE: 30°

SPECIES AND CODES:

BRRU	*Bromus rubens*
HAVE	*Haplopappus venetus*
ERCI	*Erodium cicutarium*
HOLE	*Hordeum murinum* ssp. *leporinum*
ATSE	*Atriplex semibaccata*
ASCU	*Astragulus curtipes*
MASA	*Malacothrix saxatilis*
POMO	*Polypogon monspellensis*
MEIN	*Meliotus indicus*
MEPO	*Medicago polymorpha*
HOCA	*Hordeum californicum*
LUSU	*Lupinus succulentus*
SOOL	*Sonchus oleraceus*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 10

TRANSECT LOCATION: Near Knox Benchmark on southeast end of Island.

TRANSECT SAMPLE DIRECTION: NW-SE

NUMBER OF POINTS: 100

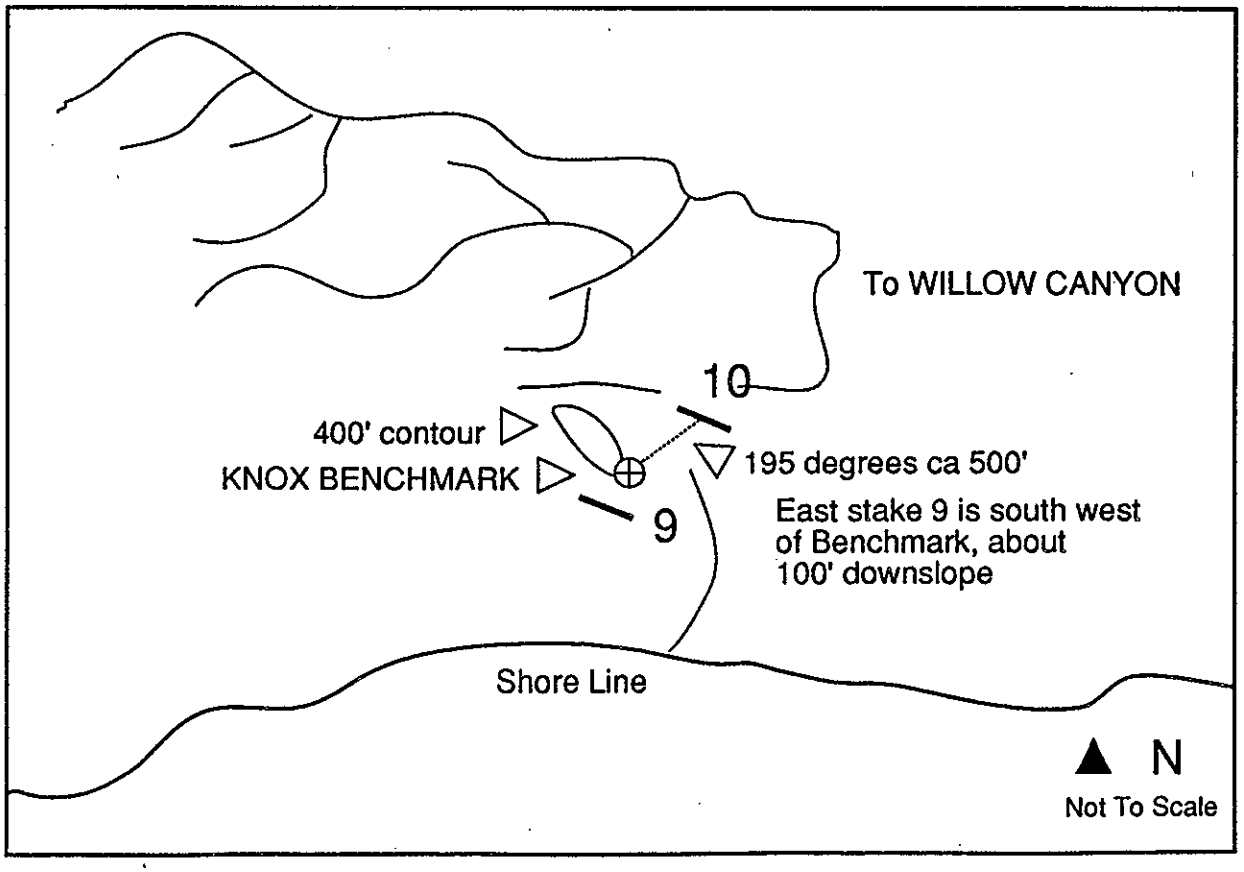
PLANT COMMUNITY: Grassland

ELEVATION: 375 ft.

SLOPE ASPECT: 55° SLOPE: 4°

SPECIES AND CODES:

AVBA	*Avena barbata*	DIPU	*Dichelostemma pulchella*
HOLE	*Hordeum murinum* ssp. *leporinum*	SOOL	*Sonchus oleraceus*
BRMO	*Bromus mollis*	MAPA	*Malva parviflora*
AMIN	*Amsinkia intermedia*	BRRU	*Bromus rubens*
ATSE	*Atriplex semibaccata*	ALPR	*Allium praecox*
MEPO	*Medicago polymorpha*	BRDI	*Bromus diandrus*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 11

TRANSECT LOCATION: In Willow Canyon

TRANSECT SAMPLE DIRECTION: NW-SE

NUMBER OF POINTS: 100

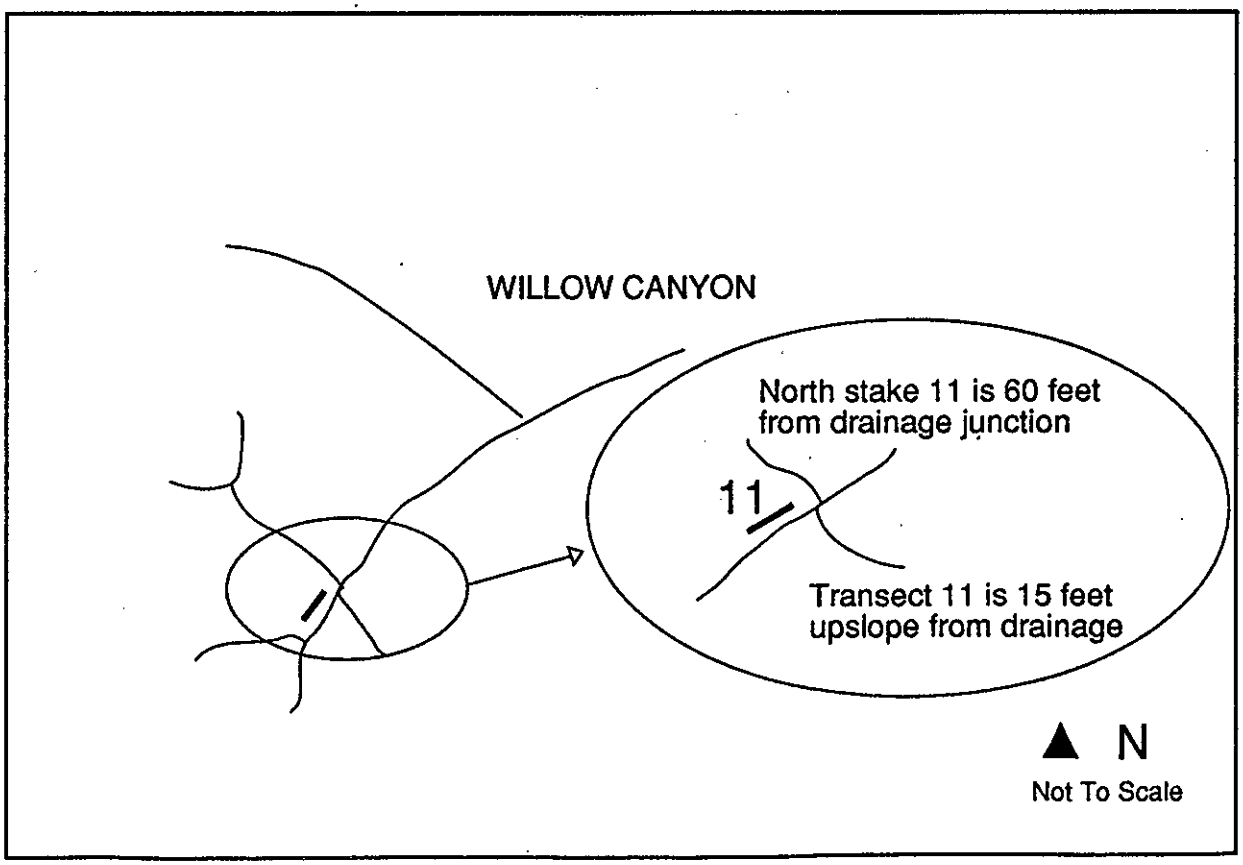
PLANT COMMUNITY: Coastal sage scrub

ELEVATION: 340 ft

SLOPE ASPECT: 160-135° SLOPE: 23°

SPECIES AND CODES:

BRDI	*Bromus diandrus*
CAMA	*Calystegia macrostegia*
ARCA	*Artemisia californica*
MAMA	*Marah macrocarpa*
AVBA	*Avena barbata*
MAVU	*Marrubium vulgare*
BRRU	*Bromus rubens*
MEIN	*Meliotus indicus*
OPLI	*Opuntia littoralis*
STPU	*Stipa pulchra*
BAPI	*Baccharis pilularis*
PODO	*Poa douglasii*
SOOL	*Sonchus oleraceus*
MEPO	*Medicago polymorpha*
VUME	*Vulpia megalura*
CLPE	*Claytonia perfoliata*
LUSU	*Lupinus succulentus*
HOLE	*Hordeum murinum* ssp. *leporinum*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 12

TRANSECT LOCATION: Southwest of wind tunnel

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

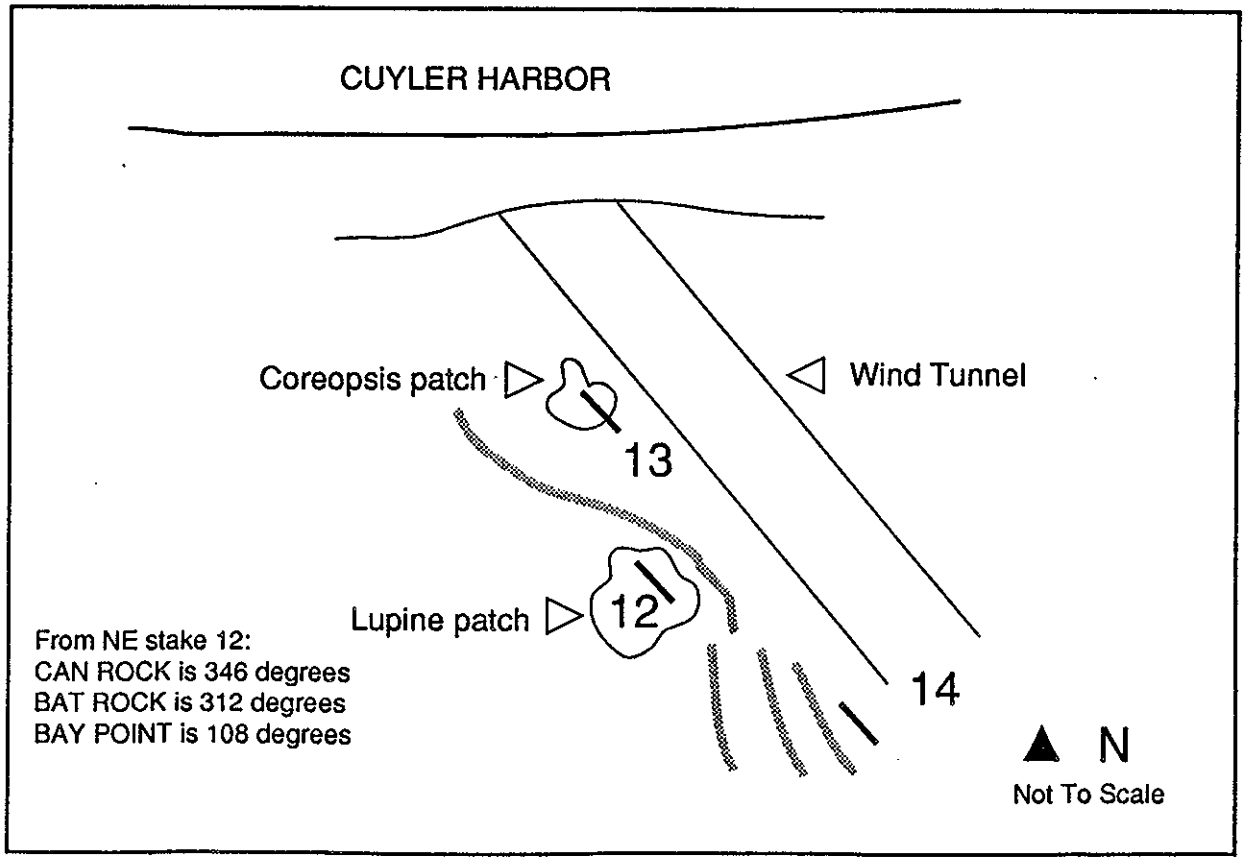
PLANT COMMUNITY: Island Chaparral

ELEVATION: 275 ft.

SLOPE ASPECT: 40° SLOPE: 18°

SPECIES AND CODES:

LUAL	*Lupinus albifrons*	PODO	*Poa douglasii*
CAMA	*Calystegia macrotheca*	ATCA	*Atriplex californica*
CAAE	*Carpobrotus aequilateris*	BRDI	*Bromus diandrus*
MAMA	*Marah macrocarpa*	MAIN	*Malacothrix incana*
PHDI	*Phacelia distans*	CHCA	*Chenopodium californicum*
HAVE	*Haplopappus venetus*	LOSC	*Lotus scoparius*
ABUM	*Abronia umbellata*	PHRA	*Pholistoma racemosum*
DISP	*Distichlis spicata*	ERGL	*Erigeron glaucus*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 13

TRANSECT LOCATION: Southwest of the wind tunnel

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

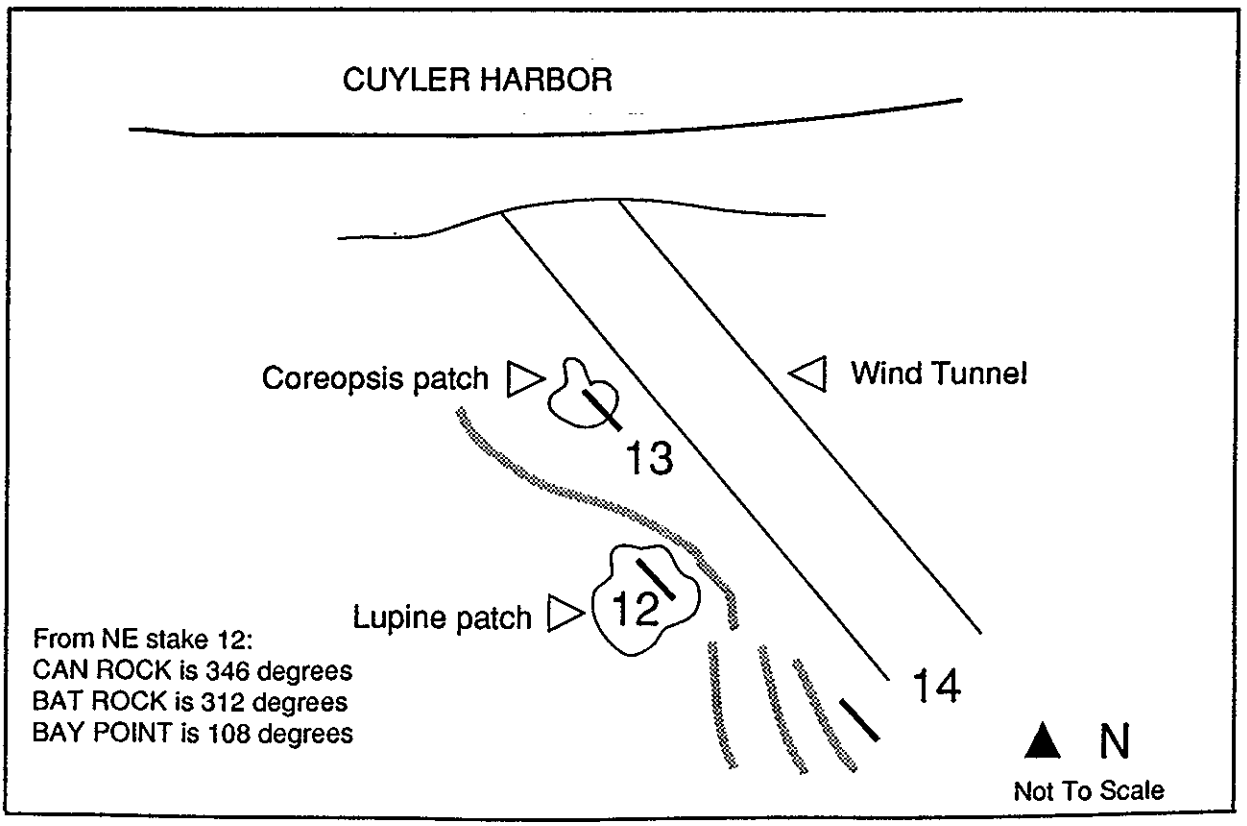
PLANT COMMUNITY: *Coreopsis* scrub

ELEVATION: 225 ft.

SLOPE ASPECT: 15° SLOPE: 4°

SPECIES AND CODES:

MAIN	*Malacothrix incana*
BRDI	*Bromus diandrus*
CAMA	*Calystegia macrostegia*
PODO	*Poa douglasii*
CAAE	*Carpobrotus aequilateris*
ATCA	*Atriplex californica*
ASMI	*Astragulus miguelensis*
COGI	*Coreopsis gigantea*
MAMA	*Marah macrocarpa*
MEIN	*Melilotus indicus*
PHDI	*Phacelia distans*
ABUM	*Abronia umbellata*
MASU	*Malacothrix succulentus*
CHCA	*Chenopodium californicum*
ESCA	*Eschscholzia californica*
LOSC	*Lotus scoparius*
LODE	*Lotus dendroideus*
CLPE	*Claytonia perfoliata*
CRCL	*Cryptantha clevelandii*
LAPL	*Layia platyglossa*
PLCA	*Platystemon californicus*
PTDR	*Pterostegia drymarioides*
ERCI	*Erodium cicutarium*
DUGR	*Dudleya greenei*
HOLE	*Hordeum murinum* ssp. *leporinum*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 14

TRANSECT LOCATION: Southwest of wind tunnel

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

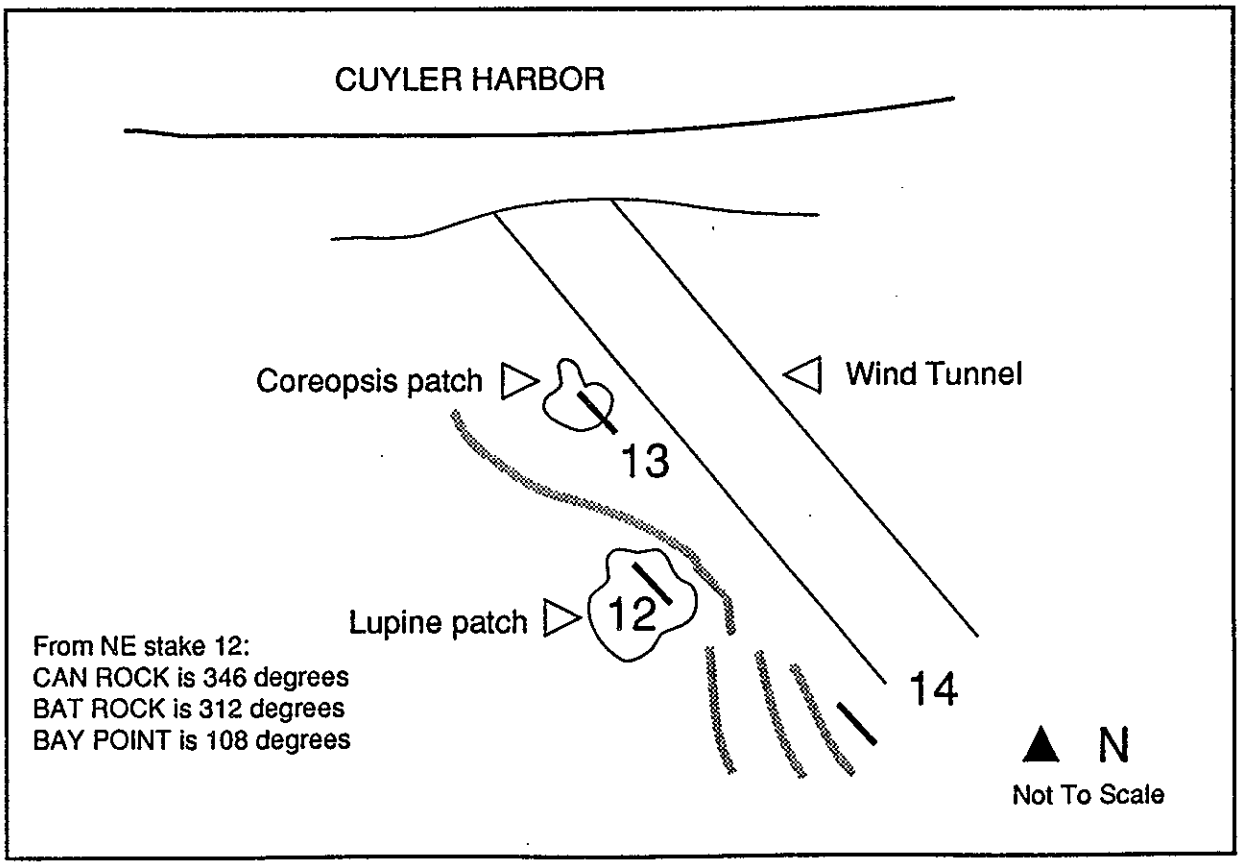
PLANT COMMUNITY: Coastal dune

ELEVATION: 280 ft.

SLOPE ASPECT: 50° SLOPE: 35°

SPECIES AND CODES:

AMCH *Ambrosia chamissonis*
MAIN *Malacothrix incana*
CAAE *Carpobrotus aequilateris*
BRDI *Bromus diandrus*
CAMA *Calystegia macrostegia*
PODO *Poa douglasii*
CACH *Camssonia cheiranthifolia*
ABUM *Abronia umbellata*
MASU *Malacothrix succulentus*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 15

TRANSECT LOCATION: Terrace southeast of the mouth of Willow Canyon

TRANSECT SAMPLE DIRECTION: N-S

NUMBER OF POINTS: 100

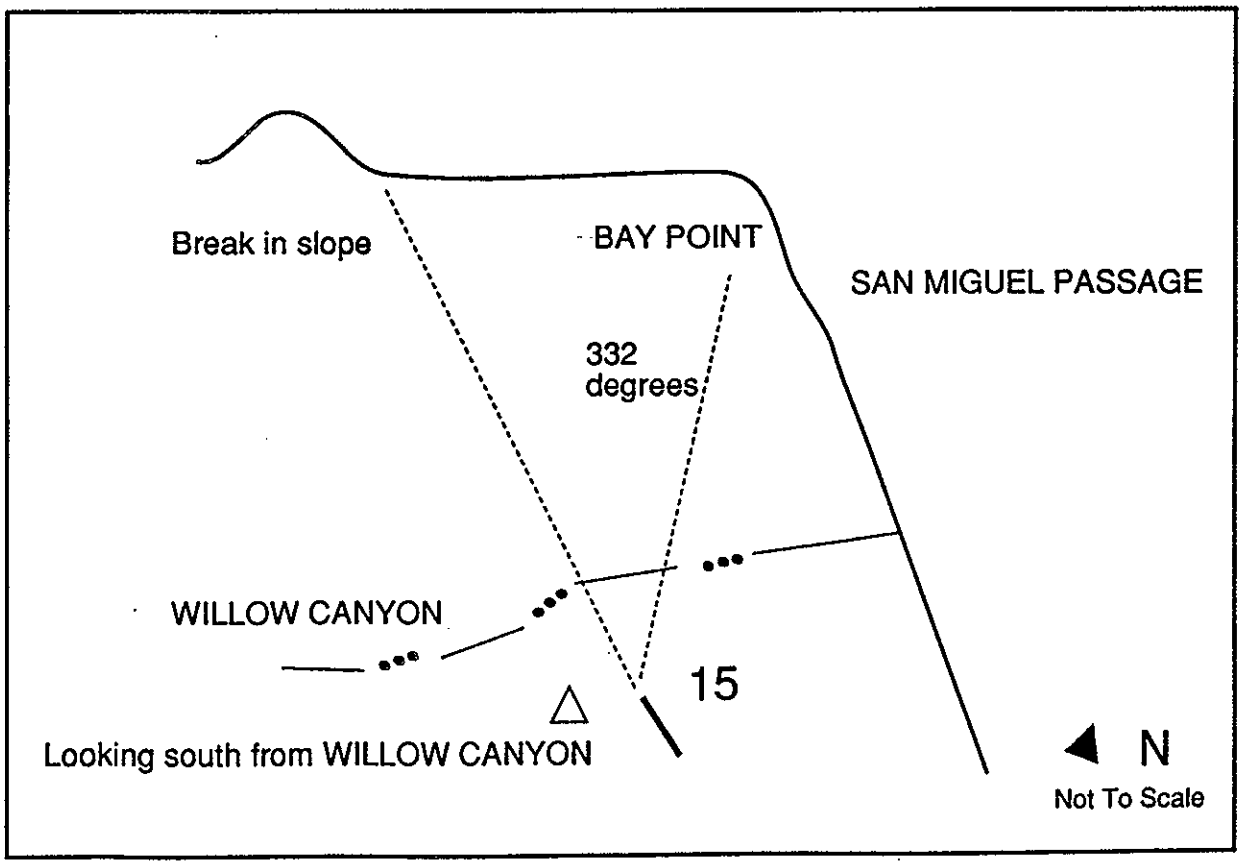
PLANT COMMUNITY: *Coreopsis* scrub

ELEVATION: 40 ft.

SLOPE ASPECT: 6 °SLOPE: 1°

SPECIES AND CODES:

HOLE	*Hordeum murinum* ssp. *leporinum*
ATSE	*Atriplex semibaccata*
COGI	*Coreopsis gigantea*
MEPO	*Medicago polymorpha*
FRGR	*Frankenia grandifolia*
STPU	*Stipa pulchra*
AVBA	*Avena barbata*
DISP	*Distichlis spicata*
ERMO	*Erodium moschatum*
AMIN	*Amsinkia intermedia*
DIPU	*Dichelostemma pulchella*
BRDI	*Bromus diandrus*
ERCI	*Erodium cicutarium*
SOOL	*Sonchus oleraceus*
MEIN	*Melilotus indicus*



VEGETATION MONITORING TRANSECT SITE DESCRIPTION
CHANNEL ISLANDS NATIONAL PARK

SAN MIGUEL ISLAND 16

TRANSECT LOCATION: Southwest side of ridge which runs southeast from Willow Canyon, near its mouth

TRANSECT SAMPLE DIRECTION: E-W

NUMBER OF POINTS: 100

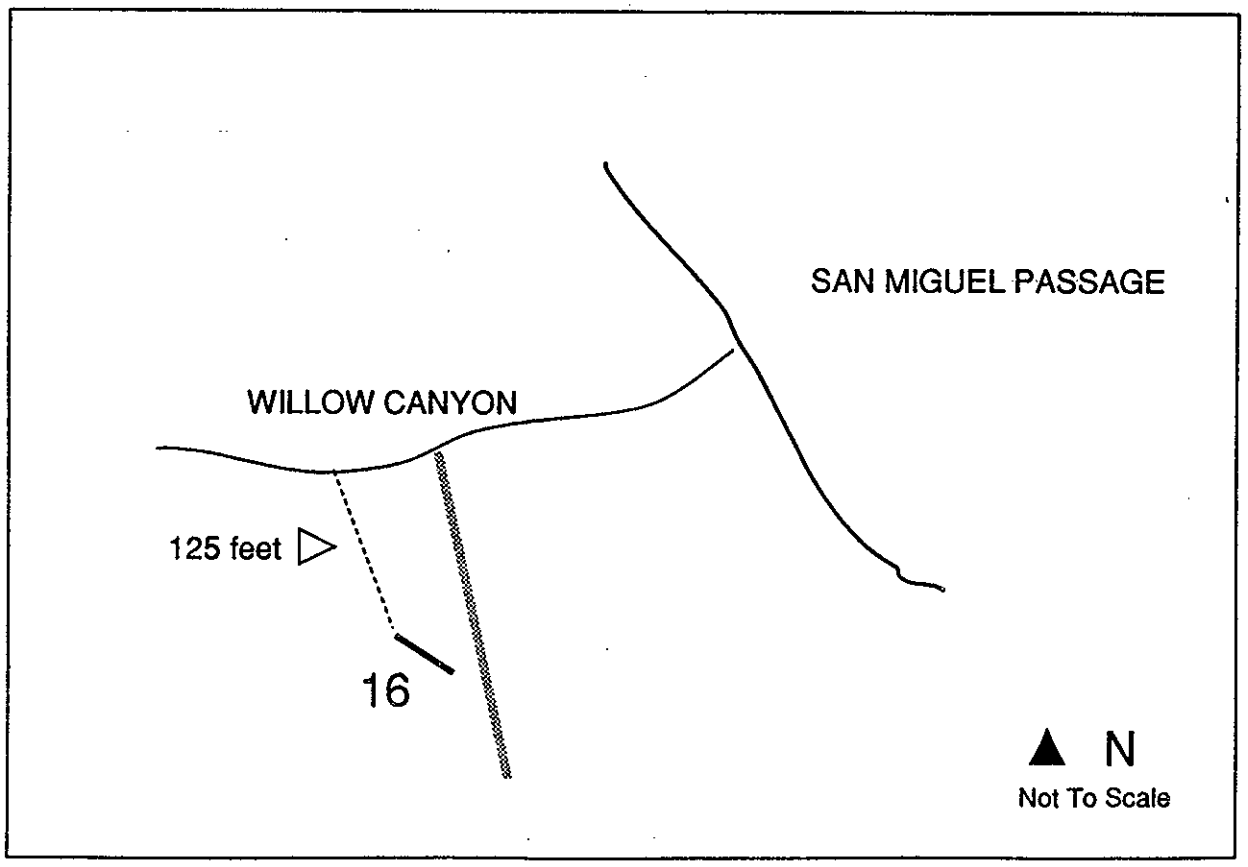
PLANT COMMUNITY: *Coreopsis* scrub

ELEVATION: 100 ft.

SLOPE ASPECT: 210° SLOPE: 13°

SPECIES AND CODES:

HAVE	*Haplopappus venetus*
BRDI	*Bromus diandrus*
PODO	*Poa douglasii*
ASMI	*Astragulus miguelensis*
COGI	*Coreopsis gigantea*
MAIN	*Malacothrix incana*
ATCA	*Atriplex californica*
COFI	*Corethrogyne filaginifolia*
MASA	*Malacothrix saxatilis*
ERGI	*Eriogonum giganteum*
MAIM	*Malacothrix implacata*
CAHO	*Castilleja hololeuca*
ERCI	*Erodium cicutarium*
ABUM	*Abronia umbellata*
ATSE	*Atriplex semibaccata*
BRRU	*Bromus rubens*
CHCA	*Chenopodium californicum*
ERMO	*Erodium moschatum*
PHDI	*Phacelia distans*
MASU	*Malacothrix succulentus*



APPENDIX B. Important Contacts

The following people are knowledgeable about methods used and island flora and can provide assistance in problem solving.

Dr. William L. Halvorson
Channel Islands National Park
1901 Spinnaker Dr.
Ventura, CA 93001
(805) 644-8157

Ms. Ronilee Clark
Channel Islands National Park
1901 Spinnaker Dr.
Ventura, CA 93001
(805) 644-8157

Mr. Steve Junak
Santa Barbara Botanic Garden
1212 Mission Canyon Rd.
Santa Barbara, CA 93105
(805) 682-4726

Mr. Steve Veirs, Leader
NPS Cooperative Park Studies Unit/Institute of Ecology
Wickson Hall
Univ. of California - Davis
Davis, CA 95616
(916) 752-7119

APPENDIX C. Terrestrial Vegetation Transect Data Form

Terrestrial Vegetation Transect Data Form

Island _____ Transect # _____ Date _____

Species ID By _____ Data Recorder _____

Comments _____

Transects Read From _____ To _____

	HT(m)	SP 1 (highest)	SP 2	SP 3	SP 4 (lowest)	SUB
001						
002						
003						
004						
005						
006						
007						
008						
009						
010						
011						
012						
013						
014						
015						
016						
017						
018						
019						
020						
021						
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024						
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034						
035						
036						
037						
038						
039						
040						
041						
042						
043						
044						
045						
046						
047						
048						
049						
050						

Terrestrial Vegetation Transect Data Form

Island _____ Transect # _____ Date _____

Species ID By _____ Data Recorder _____

Comments _____

Transects Read From _____ To _____

	HT(m)	SP 1 (highest)	SP 2	SP 3	SP 4 (lowest)	SUB
051						
052						
053						
054						
055						
056						
057						
058						
059						
060						
061						
062						
063						
064						
065						
066						
067						
068						
069						
070						
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079						
080						
081						
082						
083						
084						
085						
086						
087						
088						
089						
090						
091						
092						
093						
094						
095						
096						
097						
098						
099						
100						

Appendix D. Species (with codes) recorded on transects in 1984 - 1987.

SPECIES	CODE	SPECIES	CODE
Abronia umbellata	ABUM	*Dudleya caespitosa*	DUCA
Achillea borealis	ACBO	*Dudleya greenei*	DUGR
Achillea millefolium	ACMI	*Elymus condensatus*	ELCO
Allium praecox	ALPR	*Encelia californica*	ENCA
Amblyopappus pusillus	AMPU	*Erigeron glaucus*	ERGL
Ambrosia chamissonis	AMCH	*Eriogonum arborescens*	ERAR
Amsinckia intermedia	AMIN	*Eriogonum giganteum*	ERGI
Anagalis arvensis	ANAR	*Eriogonum grande*	ERGR
Arctostaphylos confertiflora	ARCO	*Eriophyllum confertiflorum*	ERCO
Artemisia californica	ARCA	*Eriophyllum staechadifolium*	ERST
Astragalus curtipes	ASCU	*Erodium cicutarium*	ERCI
Astragalus miguelensis	ASMI	*Erodium moschatum*	ERMO
Astragulus traskiae	ASTR	*Eschscholtzia californica*	ESCA
Atriplex californica	ATCA	*Frankenia grandifolia*	FRGR
Atriplex semibaccata	ATSE	*Galium angustifolium*	GAAF
Avena barbata	AVBA	*Galium aparine*	GAAP
Avena fatua	AVFA	*Galium* sp.	GASP
Avena sp.	AVSP	*Gillia nevinii*	GISP
Baccharis pilularis	BAPI	*Gnaphalium luteo-album*	GNLU
Bare Ground	BARE	*Gnaphalium microcephalum*	GNMI
Bromus arizonicus	BRAR	Grass unknown	GRUN
Bromus carinatus	BRCA	*Grindelia latifolia*	GRLA
Bromus diandrus	BRDI	*Haplopappus detonsus*	HADE
Bromus mollis	BRMO	*Haplopappus* sp.	HASP
Bromus rigidus	BRRI	*Haplopappus venetus*	HAVE
Bromus rubens	BRRU	*Hemizonia clementina*	HECL
Bromus sp.	BRSP	*Hordeum brachyantherum*	HOBR
Bromus trinii	BRTR	*Hordeum californicum*	HOCA
Caliche	CALI	*Hordeum murinum* ssp. *glaucum*	HOGL
Calystegia macrostegia	CAMA	*Hordeum murinum* ssp. *leporinum*	HOLE
Camissonia cheiranthifolia	CACH	*Hordeum pusillum*	HOPU
Carpobrotus aequilateris	CAAE	*Hordeum* sp.	HOSP
Castilleja affinis	CAAF	*Juncus mexicanus*	JUME
Castilleja hololeuca	CAHO	*Lamarckia aurea*	LAAU
Chenopodium californicum	CHCA	*Lasthenia chrysostoma*	LACH
Chenopodium murale	CHMU	*Lathyrus laetiflorus*	LATH
Cirsium occidentale	CIOC	*Layia platyglossa*	LAPL
Claytonia perfoliata	CLPE	*Lepidium nitidum*	LENI
Convolvulus macrostegius	COMA	Litter	LITT
Coreopsis gigantea	COGI	*Lotus dendroideus*	LODE
Corethrogyne filaginifolia	COFI	*Lotus scoparius*	LOSC
Cryptantha clevelandii	CRCL	*Lupinus albifrons*	LUAL
Daucus pusillus	DAPU	*Lupinus arboreus*	LUAR
Delphinium parryi	DEPA	*Lupinus bicolor*	LUBI
Dichelostemma pulchella	DIPU	*Lupinus succulentus*	LUSU
Diplacus parviflorus	DIPA	*Lycium californicum*	LYCA
Diplacus sp. (dark red)	DIPL	*Malacothrix implicata*	MAIM
Distichlis spicata	DISP	*Malacothrix incana*	MAIN
Dodecatheon clevelandii	DOCL	*Malacothrix philbrickii*	MAPH

SPECIES	CODES
Malacothrix saxatilis	MASA
Malacothrix succulentus	MASU
Malaphora crocea	MACR
Malva parviflora	MAPA
Marah macrocarpa	MAMA
Marrubium vulgare	MAVU
Medicago hispida	MEHI
Medicago polymorpha	MEPO
Melica impertecta	MEIM
Melilotus indicus	MEIN
Mesembryanthemum crystallinum	MECR
Mesembryanthemum nodiflorum	MENO
Mirabilis californica	MICA
Mirabilis laevis	MILA
Moss	MOSS
Muhlenbergia microsperma	MUMI
Nemophila pedunculata	NEPE
Opuntia littoralis	OPLI
Opuntia prolifera	OPPR
Parapholis incurva	PAIN
Parietaria hespera	PAHE
Pellaea andromedaefolia	PEAN
Pellaea sp.	PELL
Pennisetum clandestinum	PECL
Perityle emoryi	PEEM
Phacelia distans	PHDI
Pholistoma auritum	PHAU
Pholistoma racemosum	PHRA
Pityrogramma triangularis	PITR
Platystemon californicus	PLCA
Poa douglasii	PODO
Poa scabrella	POSC
Polypodium californicum	POCA
Polypogon monspellensis	POMO
Pterostegia drymarioides	PTDR
Rock	ROCK
Sand	SAND
Sanicula arguta	SAAR
Scleranthus annuus	SCAN
Selaginella biglovii	SEBI
Senecio vulgaris	SEVU
Silene gallica	SIGA
Silene lacinata	SILA
Silene laciniata major	SILM
Sisyrinchium bellum	SIBE
Soil	SOIL
Solanum douglasii	SODO
Sonchus oleraceus	SOOL
Spergularia macrotheca	SPMA
Stellaria media	STME
Stipa lepida	STLE
Stipa pulchra	STPU
Stipa sp.	STSP
Suaeda californica	SUCA
Tillaea erecta	CRER
Torilis nodosa	TONO
Trifolium amplectens	TRAM
Trifolium tridentatum	TRTR
Unidentified Shrub	UNSH
Vicia exigua	VIEX
Vulpia dertonensis	VUDE
Vulpia megalura	VUME
Vulpia myuros	VUMY
Vulpia sp.	VUSP
Zauschneria californica	ZACA
Zigadenas fremontii	ZIFR

APPENDIX E. Example of Completed Transect Data Form

Terrestrial Vegetation Transect Data Form

Island EAT Transect # 1 Date 5-8-87

Species ID By CMD Data Recorder JLL

Comments

Transects Read From W To E

	HT(m)	SP 1 (highest)	SP 2	SP 3	SP 4 (lowest)	SUB
001	L	Sool	Hogl			19
002	L	Brdi				10
003	L					–
004	L	Hogl				10
005	L					–
006	L	Heel				12
007	L	Heel				14
008	L	Heel				22
009	L	Heel				17
010	L	Hogl	Heel			9
011	L	Hogl				5
012	L	Hogl				17
013	L	Hogl	Sool			20
014	L	Hogl	Brmo			20
015	L	Hogl	Heel	Atsc	Brmo	18
016	L	Hogl				15
017	L	Hogl				20
018	L	Macr	Sool	Hogl	Brmo	19
019	L	Grla				30
020	L	Grla	Brmo			11
021	L	Atsc	Macr			18
022	L	Macr				16
023	L	Macr				20
024	L	Macr				10
025	L	Macr	Heel			15
026	L	Sool	Hogl	Brmo		18
027	L	Brmo	Hogl			15
028	S	Hogl	Atsc	Grla		20
029	S	Atsc	Hogl			15
030	L	Brmo				23
031	L	Macr	Brmo			11
032	L	Macr	Atsc	Hogl	Brmo	16
033	L	Macr	Grla			17
034	S	Macr				15
035	S	Macr	Grla			30
036	S	Macr	Grla			30
037	L	Macr	Grla			26
038	L	Macr				24
039	L	Macr				20
040	L	Macr				20
041	L	Macr				22
042	L	Macr				24
043	L	Macr				22
044	L	Macr				25
045	L	Macr				21
046	L	Macr				16
047	S	Macr				27
048	S	Macr	Frgr	Grla		25
049	S	Macr	Grla			32
050	L	Macr				22

APPENDIX F. Examples of Printouts and Analysis for TRANSECT Program

EAI0187
8MAY87
CMD and JLL
Transect read W to E

Total # of points in transect = 101
Average height of vegetation in meters = 0.22
Average # of species per point = 1.6

#	HGT.	CODES (Tallest to lowest)
1	.19	HOGL/SOOL
2	.1	BRDI
3	0	LITT
4	.1	HOGL
5	0	LITT
6	.12	HECL
7	.14	HECL
8	.22	HECL
9	.17	HECL
10	.09	HECL/HOGL
11	.05	HOGL
12	.17	HOGL
13	.2	SOOL/HOGL
14	.2	BRMO/HOGL
15	.18	BRMO/ATSE/HECL/HOGL
16	.15	HOGL
17	.2	HOGL
18	.17	BRMO/HOGL/SOOL/MACR
19	.2	GRLA
20	.11	BRMO/GRLA
21	.18	MACR/ATSE
22	.16	MACR
23	.2	MACR
24	.1	MACR
25	.15	HECL/MACR
26	.18	BRMO/HOGL/SOOL
27	.15	HOGL/BRMO
28	.2	GRLA/ATSE/HOGL
29	.15	HOGL/ATSE
30	.23	BRMO
31	.11	BRMO/MACR
32	.16	BRMO/HOGL/ATSE/MACR
33	.17	GRLA/MACR
34	.15	MACR
35	.3	GRLA/MACR
36	.3	GRLA/MACR
37	.26	GRLA/MACR
38	.24	MACR
39	.2	MACR

40	.2	MACR
41	.22	MACR
42	.24	MACR
43	.22	MACR
44	.25	MACR
45	.21	MACR
46	.16	MACR
47	.27	MACR
48	.25	GRLA/FRGR/MACR
49	.32	GRLA/MACR
50	.22	MACR
51	.32	BRDI/HOGL/MACR
52	.33	BRDI/HOGL/MACR/SOOL
53	.45	BRDI
54	.3	BRDI
55	.22	BRDI/HOGL/SOOL
56	.15	SOOL/BRDI/MACR/HOGL
57	.17	MACR
58	.15	MACR
59	.17	MACR
60	.21	MACR
61	.22	MACR/GRLA
62	.1	FRGR/HOGL/GRLA
63	.17	HOGL/GRLA
64	.2	HOGL/GRLA
65	.45	GRLA/BRDI
66	.3	BRDI/HOGL
67	.25	HOGL
68	.22	HOGL/FRGR
69	.26	HOGL/SOOL
70	.31	BRDI/HOGL/MACR
71	.18	HOGL
72	.25	HOGL/SOOL
73	.27	HOGL/BRDI
74	.35	BRDI/HOGL
75	.38	BRDI
76	.37	BRDI
77	.3	BRDI
78	.32	BRDI
79	.28	BRDI
80	.31	BRDI/MACR
81	.3	MACR
82	.32	COGI/MACR
83	.28	MACR
84	.24	MACR
85	.22	MACR
86	.23	MACR
87	.23	MACR
88	.27	MACR
89	.24	MACR
90	.22	MACR/FRGR
91	.22	MACR
92	.3	MACR
93	.22	MACR
94	.3	MACR
95	.3	MACR
96	.32	MACR
97	.2	MACR
98	.22	MACR
99	.15	MACR
100	.15	MACR
101	.15	MACR/FRGR

Transect number EAST ANACAPA ISLAND 01

100 points

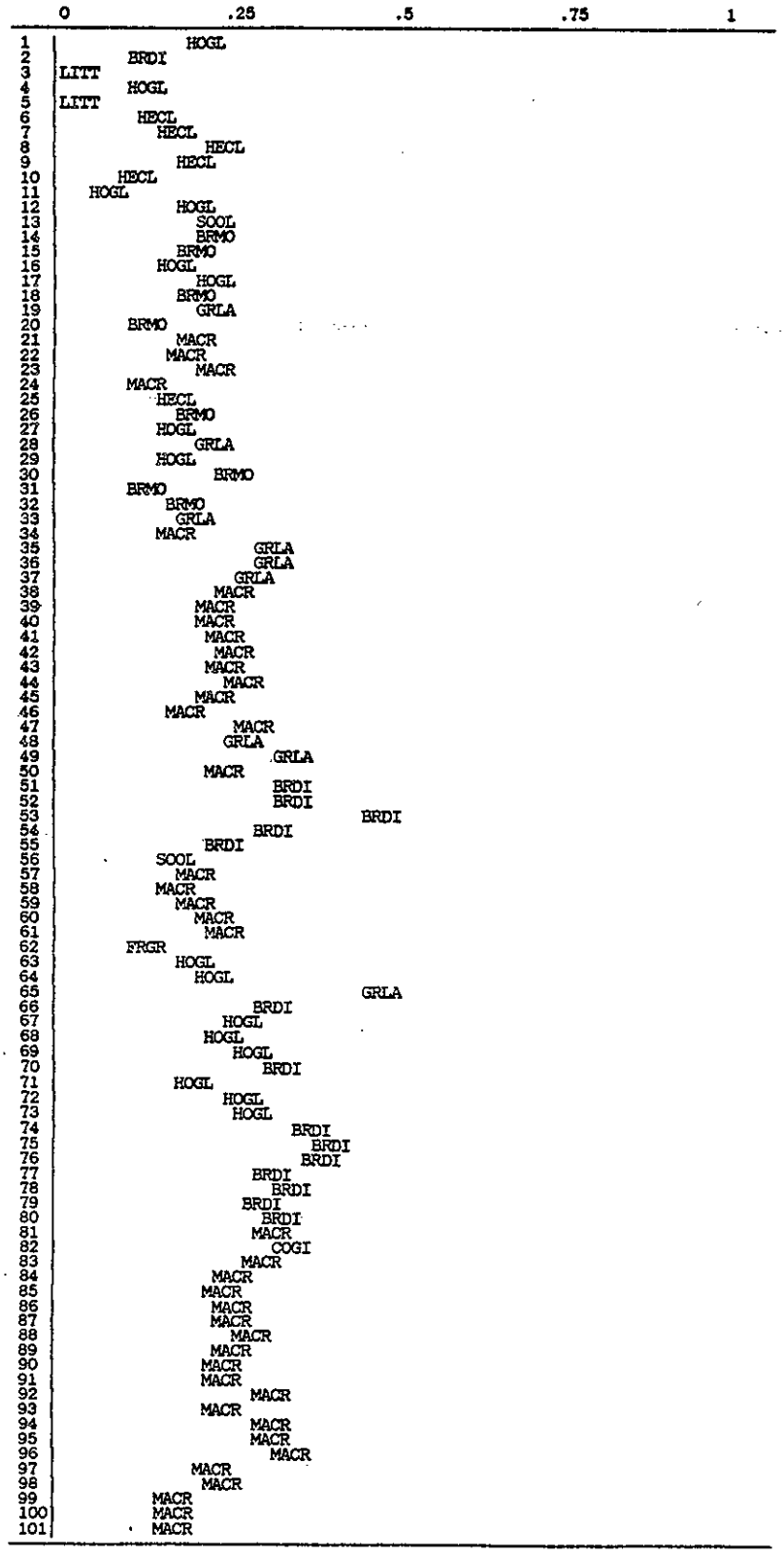
PERCENT ABSOLUTE FREQUENCY

SPECIES	6APR84	15FEB85	8MAR86	8MAY87	CHANGE	AVERAGE
Hordeum glaucum	40.0	39.0	43.0	31.7	-8.3	38.4
Malaphora crocea	39.0	43.0	49.0	56.4	17.4	46.9
Grindelia latifolia	27.0	25.0	9.0	13.9	-13.1	18.7
Atriplex semibaccata	16.0	3.0	1.0	5.0	-11.0	6.2
Achillea millefolium	3.0	1.0	1.0	0	-3.0	1.3
soil	3.0	3.0	1.0	0	-3.0	1.8
Coreopsis gigantea	2.0	2.0	6.0	1.0	-1.0	2.7
Bromus diandrus	1.0	0	0	17.8	16.8	4.7
Frankenia grandifolia	1.0	0	0	5.0	4.0	1.5
Sonchus oleraceus	1.0	0	0	8.9	7.9	2.5
Spergularia macrotheca	1.0	1.0	0	0	-1.0	0.5
Hemizonia clementina	0	15.0	13.0	6.9	6.9	8.7
Dichelostemma pulchella	0	3.0	4.0	0	0.0	1.8
Litter	0	2.0	0	2.0	2.0	1.0
Chenopodium murale	0	1.0	0	0	0.0	0.3
Anagalis arvensis	0	0	6.0	0	0.0	1.5
Avena barbata	0	0	3.0	0	0.0	0.8
Erodium moschatum	0	0	2.0	0	0.0	0.5
Medicago polymorpha	0	0	2.0	0	0.0	0.5
Claytonia perfoliata	0	0	1.0	0	0.0	0.3
Hordeum californicum	0	0	1.0	0	0.0	0.3
Pterostegia drymariodes	0	0	1.0	0	0.0	0.3
Silene gallica	0	0	1.0	0	0.0	0.3
Bromus mollis	0	0	0	8.9	8.9	2.2
NUMBER OF SPECIES	11	12	17	11	0	12.8
SUM OF FREQUENCIES	134.0	138.0	144.0	157.4	23.4	143.4

101 points were read in 1987.

EAI0187
8MAY87
CMD AND JLL
Transect read W to E.

Total # of points in transect = 101
Average height of vegetation in meters = 0.22
Average # of species per point = 1.6



Appendix G. TRANSECT -- A Computer Program for Vegetation Analysis

TRANSECT -- A Computer Program for Vegetation Analysis

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TRANSECT is a menu-driven computer program that performs data storage and retrieval, calculates the frequency and dominance of species in transects, and compares results over time or space. The program is designed for use with an IBM PC or XT (or compatible) with two disk drives or a hard disk, a minimum of 256k RAM, and a Toshiba P351 printer. Other systems may work depending on their compatibility with the IBM and the Toshiba systems.

TRANSECT uses data from vegetation plots that measure presence/absence of species. Transects can range from one to 1000 point plots. Use of the program entails development of one or more species lists (with associated four-character alphanumeric codes), entering of field data and general text descriptions for the transect. The data consists of the vegetation height in meters, plus codes for the tallest species and other species at the point (including codes for other items such as substrate if you wish).

After a species/code list is created and data is input, several products can be obtained, including printouts of raw data; tables for single transects listing the frequency, dominance and percent as tallest for each species plus means of vegetation height and number of species per point; tables for combined transects listing the same results as for single transects; height profiles of single transects by the tallest taxa; tables of percent frequency or relative dominance for a selection of transects, showing change over time or space (including net change and mean for period) and change and mean for number of species and sum of frequencies; and graphs of selected species showing change over time by frequency or relative dominance.

SETTING UP THE PROGRAM.

Hard disk computers: First create a new directory that you will use for the program and copy sufficient system programs onto this directory that will allow running of programs and file management. Also copy SORT.EXE onto the directory. If you have a BASIC compiler and plan to modify the TRANSECT program to fit your particular needs, copy BASICA.EXE onto the directory as well. Next, copy the files from the supplied program disk onto the hard disk directory (you do not need to copy TRANSECT.BAS if you do not intend to modify the program with a BASIC compiler.) Note: You do need to copy the example files (those with the extensions .LST, .TXT, .DAT, and .RSL) in order to avoid a "file not found error" when you first run the

program -- after you have your own .LST, .TXT, .DAT, and .RSL files then you can erase the example files. Finally, at the DOS prompt, simply type TRANSECT and the program will run (you can, of course, set up a BATCH macro to run TRANSECT from a menu.)

Double disk drive computers: Follow the directions above except copy the TRANSECT programs onto your system disk (for drive A) and the example files (.LST, .DAT, .TXT, and .RSL) onto a blank formatted disk that will be your storage disk (drive B). Then, from the DOS prompt type "B:" (this is important in order to change the default drive to the storage disk). From the B:> prompt, type A:TRANSECT; this will load and run TRANSECT (and will also allow the greatest amount of storage on your storage disk). Again, a BATCH macro can perform this last function for you from a menu.

STEP BY STEP INSTRUCTIONS.

The following is a discussion of all of the menus in the TRANSECT program. It is recommended that first-time users read this section once through and then run the program trying all of the various modules. The first time through, you should use the example files that are provided in order to become familiar with the format of the final documents. Many of the terms used in the discussion are listed in the glossary.

MAIN MENU

From the Main Menu, you select other menus depending upon the job you wish to perform. These other menus are discussed in more detail in the following sections. The exception is item 5, the "Define subset of files" key. New users of the TRANSECT program will not need this function until they have built up such an extensive library of data and result files that a list of them will not fit on one screen. However, it is important to remember to name your data and result files in a systematic manner so that 1) you can use the "define subset of files" function, and 2) you can manipulate your files from DOS, if necessary, by using the wild card characters. For example, one method of naming files is to reserve the first 4 characters of a filename for a location code, the next 2 characters for a transect number at that location, and the last 2 characters for the year the transect was taken (filenames have an 8 character maximum). Thus GANN0787 would indicate transect #7 at Gann's Prairie, taken in 1987. The format is not important as long as it is standardized for you. Once you have a great many data files, you can then use the "define subset of files" function. Using the above example, if during my work session I only planned to use data from Gann's Prairie, I would respond to the function by typing "GANN", or if I would only be working with files from 1987 I would respond to the prompt with "??????87" (note that the question marks are necessary to inform the computer that 6 characters come before the "87"). Whenever you need to redefine the subset being used just return to the Main Menu and run item 5. You can indicate that you wish to see all files by just typing a null carriage return.

SPECIES/CODES MENU

<1> CREATE list of species and codes
<2> LOAD species and codes file
<3> SAVE present species and codes to file
<4> EDIT species and codes array
<5> PRINT list of species and codes

<1> CREATE list of species and codes.

This module lets you create an array of species and shorthand 4 character codes. Species include plant species found along the transects as well as any other items you wish to include in the analysis, such as substrate type, gopher mounds, animal droppings, litter, etc. Codes can include any alphanumeric character except commas, colons or slashes (/).

The array is used in most other modules; and the use of codes instead of the full species name saves much time in entering data and in reducing misspellings in the results (the shorthand codes should be identical to the codes used in data collection in the field, thus providing a simplified transfer of data from the field to the computer's storage).

The create module first checks that no array is already in memory as running the module will erase any species/code array already in memory.

To create a species/code array simply key in the species name and code at the appropriate prompts. Codes can be no longer than four characters and should be entered in capital letters (and MUST be in the same case as codes entered during data input in other modules).

When you have finished entering your species and codes into the array enter a null <CR> to both the species and codes prompts. The program will then inform you how many species are in the array (1000 is the maximum), and ask if you want to continue adding or if you are done.

You cannot correct mistakes in this module after you enter a <CR>, you must use the edit module (the edit module is also where you go to add species to the array). The simplest method for error correction is to make a list of the spelling errors as they occur, and then process them all at one time from the edit module.

<4> EDIT species and codes array.

Run this module to either edit spelling in species/codes or to add new species/codes to the array.

The edit module will ask if you want to <A>dd species and codes, <S>earch for an occurance (such as a misspelling), <C>hange an occurance in the array, or <Q>uit back to the Species Menu.

Before you can <C>hange an item in the array, you must know the array element number. To find this number, press the "S" for search and enter all or part of the item you are looking for. For example, to find the array element number of a known misspelling (such as

"Pseudosuga"), at the prompt you can enter "Pseudosuga", or "Pse", or "suga", or "PSME" (providing that PSME is the code for that species). The program will search the entire array and display a list of all elements that contain a match for the characters you input. Thus, the longer or more unique the character string you search for, the shorter the list will be that is displayed.

To run the <C>hange function, type "C" and then enter the array element number. The program will then display the species and code for that number and prompt you to enter the new information. If you made a mistake and chose the wrong number, you must re-inter the species and code data anyway.

<3> SAVE present species and codes to file.

The species/codes array you have created or edited resides in computer memory and must be saved to disk if you intend to use it again.

This module will first display the filenames of all the files that have the extension ".LST" in order that you may choose a filename that does or does not (as you see fit) match another filename. Enter the filename at the prompt, but DO NOT include the ".LST" extension, the program will add that for you. The species/code array will then be written to disk, and remain in memory as well.

<2> LOAD species and codes file.

This module will load a species/code file into memory. Any species/code array array presently in memory will be lost and replaced by the file data. At the prompt, enter the filename to load without the .LST extension. The program will then load the file and display how many species it contains. (Note: your DOS manual will tell you how to merge two species/codes files if you wish to do this.)

<5> PRINT list of species and codes.

This module will type the species and codes array presently in memory on the line printer. It is important that you have a working copy of this print-out in order to 1) know which species equals which code when you are prompted to enter codes in other modules, and 2) prevent using the same code twice for two different species.

SORTING the species/code array.

Because analysis is completed by searching through the species/code array in numerical order, it is convenient to have this array in alphabetical order so that the print-outs are displayed or printed that way as well. Also, a sorted array helps to prevent using the same code for two different species.

TRANSECT does NOT sort the array or file, however, the DOS command program SORT.EXE will perform this function for you (sorting the species/code files by species name). The procedure is to exit TRANSECT and at the DOS prompt type SORT <filename1.LST >filename2.LST. Filename1 is the species/code array file created in TRANSECT. Filename2 is the new sorted version file you wish to create. Be sure to include the .LST extension in both filenames,

otherwise TRANSECT will not be able to find and load the sorted file. Also be sure that filename2 resides on the the default directory or disk while TRANSECT is running.

After the DOS sort is completed, you can run TRANSECT, load the new sorted species/code file from the Species Menu and then print or use the new file.

TRANSECT PLOT MENU

<1> Input PLOT TEXT data
<2> Start to INPUT plot point data
<3> EDIT plot point data (add, change, inspect)
<4> LOAD plot data file
<5> SAVE plot data to file
<6> PRINT PLOT TRANSECT data
<7> SET FUNCTION KEYS

The Plot Menu lets you create, edit and print the RAW data as it comes from the field work (see RESULTS FILES MENU for creating files from the results that you may have compiled before obtaining the TRANSECT program).

When inputting raw data from the field, it is necessary for the TRANSECT program to create two files, one of text, and another of the data itself. Separate files allow the program to run at greater speed and prevent accidental reading of text as data during analysis.

<1> Input PLOT TEXT data.

This module gathers the text information for each transect. You are prompted to input the location of the transect, the date the transect was taken, and miscellaneous notes. The miscellaneous notes are limited to 253 characters each and are completed by a carriage return <CR>.

You are then prompted to input "non-plot species"; that is, species which occur adjacent to, but not actually in the plot. Respond by typing their full names, NOT the codes. When finished, type a null <CR>. This text data is stored in memory.

This module does not have an edit function, so if you make a mistake you will have to run the entire module again.

<7> SET FUNCTION KEYS

Prior to inputting the raw data from a transect it is very convenient to set the function keys (F1-F10). The procedure is to scan the raw data from the field and select up to ten of the most commonly occuring codes that you will be inputting. Then run this module and follow the prompts. After you have assigned some or all of the function keys to particular codes, you can then use a single keystroke for these most common codes.

<2> Start to INPUT plot point data.

This module lets you input the raw data from a transect. Please note that this module only STARTS the input process -- if you have

already started and then left this module to edit you can continue adding data from the edit module.

The module first checks whether there is data already in memory and if so asks if you intend to restart from the beginning (answer no if you were only going to add to the transect, or if you had not yet saved a previous transect).

You are then instructed to enter the height of vegetation for a particular point number (ignore the reference to "points" if your plots along a transect are non-point). If you don't have height data type a null <CR>.

You are then asked to input the codes for the point (or plot) on the transect. Enter the codes -- putting a slash (/) between each code.

If you are entering height data, the first code input should be the tallest species at that point (plot).

When you are done inputting data for a transect, enter a null <CR> for both height and codes.

<3> EDIT plot point data (add, change, inspect)

Upon entering this module, the program will display the edit menu, allowing you to <A>dd to the end, <L>ook at a point, <C>hange a point, <G>lobally replace or delete a code throughout the transect, or <Q>uit back to the main menu.

For <L>ook and <C>hange you will be asked for a single point number. For <G>lobal you will first be asked for the code to replace (a null <CR> will let you escape from this function), then for the replacement code. To delete the first code entirely from the transect enter a null <CR> to the second prompt (if you made a mistake, enter the same code for the second prompt as you entered for the first).

The <G>lobal function is useful when you already have data files and wish to update the codes. For example, you may have a species Lupinus sp. with an assigned code of LUSP; and then later decide that the species in question is Lupinus albifrons. You can add Lupinus albifrons to your species/codes file (say with the code LUAL) and then transect by transect globally replace LUSP with LUAL.

After the <G>lobal function finishes running it will display the number of replacements or deletions that occurred.

<5> SAVE plot data to file.

Your transect data resides in memory, so after you create it or edit it you must save it to a disk file.

The module will first display the raw data files on your directory (or storage disk). These have the extension .DAT, and each .DAT file has a .TXT companion file (not displayed as the filenames, except the extension, are identical). Be sure that if you are inputting data for a particular transect for the first time that you have run both the text and the data input modules before saving your file.

Reply to the prompt with the filename you wish to use for the raw data file. Do NOT include the extension. The program will create two files for you, one with the .DAT extension and one with the .TXT

extension.

<4> LOAD plot data file.
In order to edit or add to a data file it must first be loaded into memory. The program will display the data files on your disk and ask for a filename to load. Again, do not include the extension. The module will load both the .DAT file and the .TXT file into memory for your editing. If you change the data (including the input TEXT data module) be sure to resave it.

<6> PRINT PLOT TRANSECT data.
This module will list on the printer the raw data for the transect that currently resides in memory. Follow the prompts.

RESULTS FILE MENU

<1> CREATE result files
<2> EDIT result files
<3> PRINT result file

In order to run the comparative analysis modules in the Analysis Menu, result files (files with the .RSL extension) must either be created by 1) converting existing raw data files (.DAT files) or 2) manually entering the results (frequencies) from prior data. The Result File Menu will create these files for you, print them on the printer, or allow you to edit them. The TRANSECT program automatically sorts the result files you create in descending order of frequencies.

<1> CREATE result files
This module starts by asking whether you wish to create a result file from an existing raw data file that resides on disk, or wish to enter the results yourself.
If you want the program to create the result file for you, you will be asked to enter the filename of the .DAT file (do not include extension). The module will then run and create a result file with the same filename as your .DAT file (but with the .RSL extension).
To enter the results for yourself (i.e., if you don't have a raw data file), you will first be asked the filename of the result file to save (as usual, do not include the .RSL extension); and then asked to supply some text data. You will then be asked to enter the code and percent frequency for each species in the transect. When finished, type a null <CR> to the code prompt. You will then be asked if you are done, and if so, the file will be sorted by frequency and then written to disk.

<2> EDIT Results File.
This module will allow you to edit result files, but first the file must be loaded from disk into memory. Respond to the prompt with the filename (without extension). The file will then be loaded

and the edit menu will be displayed.
You may <A>dd entries, <D>elete entries, <L>ist the file, or <R>eplace codes. If adding, you will be asked for the code and then the frequency; if deleting you will only be asked for the code. For both functions a null <CR> will return you to the edit menu. The <L>ist function allows you to check your editing progress (though the file will not be sorted until it is written to disk).
When finished, the <E>nd function sorts by frequency and then writes the file to disk.

<3> PRINT Results File.
This module works the same as the List function in the results edit menu, except the file is sent to the printer. Respond to the prompt with the filename to print (without the extension, of course).

ANALYSIS MENU

<1> Table for SINGLE transect
<2> COMBINED transects table
<3> HEIGHT GRAPH for single transect
<4> COMPARATIVE analysis table and/or graph

Excepting the Print Height Graph analysis, the appropriate species/code array must reside in memory -- so always load the species/code file before running any analysis.

<1> Table for SINGLE Transect.
This module sends to the display or printer the completed analysis from one raw data (.DAT) file. It prints in descending order of frequency a table of the species found on a transect. Also included are the species relative dominance, text information and adjacent (non-plot) species.
Note: This module requires .DAT files. See the comparative analysis section for information on how to make a similar table for a single transect that has only a .RSL file available.
You are only prompted whether to send the analysis to the printer or the display. If sent to the printer, the video display will inform you of the progress of the analysis (by counters); if sent to the display only, you may have a long wait with little activity while the program runs (especially with long and large transects and/or a large species/code file).

<2> COMBINED Transects Table.
This module is similar to the single transect analysis except that you are allowed to add transects together in order to analyse a set of transects (useful if you have a number of transects from one locality, or one type of vegetation). Only raw data (.DAT) files can be used, there is no provision for this type of analysis using result (.RSL) files.
You are first prompted as to whether you wish to send the analysis to the printer (recommended). You are then asked for text

information, and non-plot (adjacent) species. This information is not taken from the files because an adjacent species from one transect may be included in another; and you may wish to change the text description of the analysis.

You are then asked for one raw data filename at a time (without extension). After each file is entered the program runs, displaying its progress with counters. The filenames do not have to be in any particular order, but you should take care to spell the filenames correctly, otherwise you will have to begin the module all over again.

After the last filename has been entered and analysed, respond to the filename prompt with a null <CR>. The table will then print, although it may start slow as further processing is occuring.

<3> HEIGHT GRAPH for single transect.

This module sends to the printer a linear graph of the height of vegetation, printing at the corresponding height the code of the first species listed for each point in the raw field data. It can only be used with raw data (.DAT) files that have the height data included.

You are prompted to enter the filename of the .DAT file you wish to graph, and then to choose one of the three scales. Enter a scale number that is taller than the highest height in the file.

This graph is intended to be overlaid with other graphs from the same transect, but different times; in order to compare the relative heights and the species. Keep this in mind when choosing the scale.

<4> COMPARATIVE Analysis Table and/or Graph.

Note: This module works with result files (.RSL) only. Raw data files (.DAT) must first be converted to result files using the Result File Menu.

This module is actually two separate analyses that have been combined to save labor in entering text data and filename lists. The comparative analysis will produce either a table listing all species for one transect location or a graph of a set of species that you choose. They both show the change in frequency or dominance at one transect location over time (or different transects over space).

The module begins by having you create a list of filenames to process. Start with the filename (without extension) of the earliest time the transect was taken (or one end of the spatial continuum). Continue adding filenames in chronological (or spatial) order. When finished respond to the prompt with a null <CR>.

You will then be asked if you want the analysis done as frequency or as dominance.

The program will then load the files and build the comparative analysis array.

After the array is built you may specify either a table or a graph print-out at the comparison subroutines menu.

With either choice (if this is the first time you run this module with this set of filenames) you will be prompted for text information (transect number, location, number of points in transect, and

footnotes, if any).

If you choose the table format the program will proceed to print the table on the printer. If you choose the graph format you will be prompted for the codes of the species you wish to plot. When you are done listing codes respond with a null <CR>. The program will then send the graph to the printer.

When the comparative table or graph is completed you will be returned to the menu where you can choose the other format if you desire. If you wish to change from frequency to dominance analysis (or vice versa) you must <Q>uit at the menu and start again at the Analysis Menu. Your text and filename list will be preserved.

There may occasionally arise a situation where you wish a single transect table but do not have a .DAT file. You can do this from the comparative analysis menu by choosing only the single result file for the filename list and then printing the table option. This version of the single transect table is not as complete as the .DAT file version, and will also print extraneous data (such as change over time).

A NOTE ON ERRORS:

The TRANSECT program has a limited error catching ability. Non-fatal operator errors will generally provide you with an explanation and then allow you to resume processing. (A "Redo from start..." prompt means the program was expecting numerical data input and received alphabetical input instead -- respond by checking the prompt above the "Redo" statement and input a number only.)

Fatal errors (program, device, or operator) will stop processing and inform you of the error's "token number". This number can be looked up in the appendix of your Microsoft BASIC manual. You will then be dumped to the Main Menu. All data in memory should be preserved and you can try the module again.

This error catching ability can also help you to escape from a module you do not want to be in if you purposefully input a response that will create a error (such as a non-existant filename).

MISCELLANEOUS NOTES:

1) It is recommended that no other files with the extensions of .LST, .RSL, .DAT, or .TXT reside on the directory where program data files reside.

2) It is important that you never use either a code or frequency of "9999" as this number is used as a flag to mark locations in files.

3) When inputting text data, do not use commas, colons or double quotation marks within the text (use apostrophes and/or dashes).

4) Always keep backup copies of files on separate directories or diskettes.

LIMITS OF PROGRAM:

Number of species/codes in one file (array) = 1000
Number of points (plots) per transect = 1000
Number of adjacent species per transect = 25
Number of data files for combined transect analysis = 25
Number of result files in comparative analysis array = 20
Number of species in comparative array = 200
Number of species in single transect results = 150
Number of lines of footnotes = 25.

GLOSSARY:

ARRAY - An ordered table of one or more dimensions.
ADJACENT SPECIES (or non-plot species) - Species which occur in vicinity but not on transect.
CODE - The shorthand abbreviation (of up to 4 characters for each species).
.DAT FILE (or array) - The raw vegetation data; that is, a list of codes associated with each point (plot) on a transect.
DOMINANCE (= relative dominance) - The frequency of a species divided by the sum frequency of all species, multiplied by 100.
FREQUENCY - The number of times a species occurs in a transect divided by the total number of points in a transect, multiplied by 100.
NULL <CR> - A carriage return without any preceding characters.
PERCENT AS TALLEST - The frequency of a species on a transect as the tallest species at each point.
PLOT - A location of data collection along a transect (may be point or specific area).
.RSL FILE (result file) - A table of species and frequencies for each transect.
TRANSECT - A line across the landscape upon which plots are taken.